CALIFORNIA
OIL WORLD
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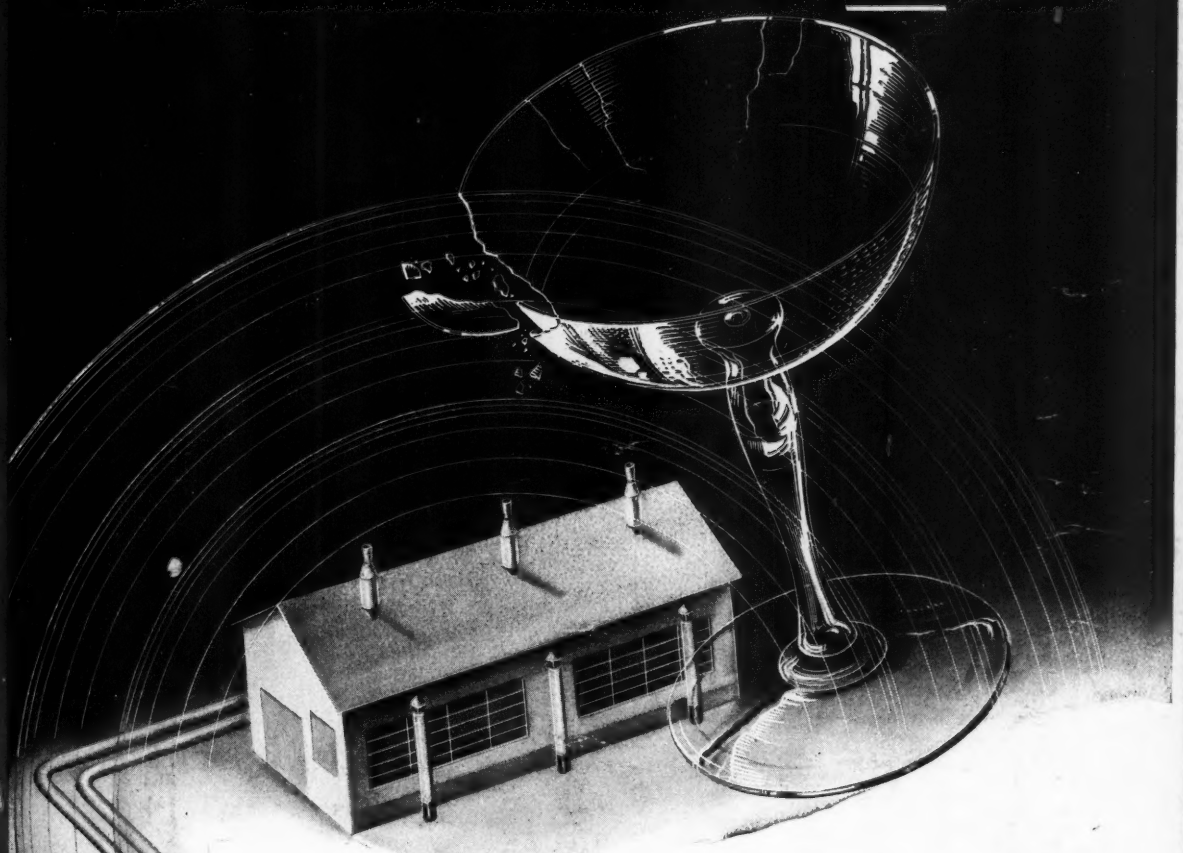
DOES PULSATION PLAY TRICKS IN YOUR PLANT?



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CALIFORNIA
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January 15th, 1946
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Washington Highlights

Immediate upping of production of crude oil in California to produce an additional 42,000 barrels per day of Navy special fuel oil required under the new program of using aircraft carriers, battleships and other combat vessels as troop carriers, has been requested by the Navy Department.

The program is part of a nationwide quota of 70,000 barrels per day which the Navy says it will require to bring combat veterans back to the United States and to ship replacements for these men to overseas stations.

The Navy's needs were made known at a meeting in the office of Rear Admiral A. F. Carter, Executive Officer of the Army-Navy Petroleum Board on December 28th in a conference with H. C. Ide, Executive Assistant to Deputy Petroleum Administrator Ralph K. Davies.

As a result of the decision, telegrams were dispatched to eleven of the principal West Coast refiners, notifying them of the action and requesting that they send representatives of their companies to a meeting in Los Angeles on January 4th. This date was later postponed to January 8th.

In the meantime, before Petroleum Administration representatives could reach the West Coast, a number of industry executives met informally in Los Angeles on January 5th to discuss the proposals. At this meeting it was informally agreed that the California companies could supply their quota of 42,000 barrels per day, but that arrangements should be made by Navy representatives with individual companies.

A meeting will also be held on January 7th in Washington to discuss the possibilities of getting the additional 28,000 barrels per day from the Texas and Rocky Mountain fields, and a request for aid from the British.

The same day as the meeting with Admiral Carter, Mr. Ide talked to Sidney Kilbey, acting head of the Office of the British Petroleum Representative in Washington, requesting that he make available an additional 30,000 barrels daily from the Persian Gulf area, and received assurances that the British would do everything possible to aid.

Navy estimates were that the new requirements would result in first quarter crude production of 885,000 barrels per day and refinery operations of 825,000 barrels daily.

One of the major problems involved is the storage of the additional gasoline which would be produced under the increased program. However, the Navy has promised to permit the utilization of Navy storage tanks to complement the already burdened storage facilities of the West Coast.

Among those who accepted the invitations to the Washington meeting were: George A. Wilson, former Transportation Director of PAW; Howard W. Page, former Director of the Program Division, PAW; Walter Hochuli, former Director of the Marketing Division, PAW; Lucien F. Craig, former Assistant Director of Supplies and Transportation, PAW; and Charles Harding, former Director of District I.

Telegraphed invitations to the Los Angeles meeting were sent to S. J. Dickey, President of the General Petroleum Corp., Los Angeles; Charles S. Jones, President of the Richfield Oil Corporation, Los Angeles; R. G. Follis, President of the Standard Oil Company of California, San Francisco; Reese H. Taylor, President of the Union Oil Company, Los Angeles; Sidney Belither, Executive Vice-President of the Shell Oil Company, Inc., San Francisco; T. H. Webb, Vice-President of The Texas Company, Los Angeles; George L. Machris, President of the Wilshire Oil Company, Inc., Los Angeles; Will J. Reid, President of the Hancock Oil Company, Long Beach; A. L. Marsten, President of the Mohawk Petroleum Corporation, San Francisco; and Harry S. Rothschild, President of the Rothschild Oil Company, Santa Fe Springs.

Final liquidation of the Petroleum Industry War Council and the Foreign Operations Committee, including their committees and subcommittees, was announced by Petroleum Administrator for War Harold

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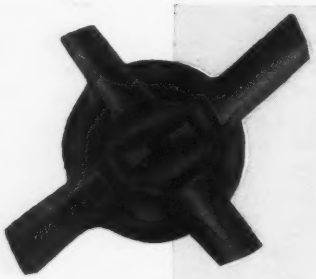

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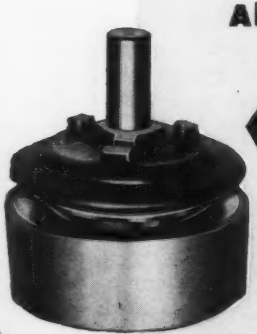

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L. Ickes on the day after Christmas.

The liquidation was effected by rescinding Recommendation 24, which outlined the duties, functions and procedures of the PIWC, and Directive 70, under which the supply and transportation of the combined petroleum resources of the United Nations in the foreign field were administered and which authorized establishment of the Foreign Operations Committee as an advisory body.

In his final press conference of 1945, Ickes announced that he planned a major expansion of the Petroleum Administration within his Interior Department to aid the industry in its peace time needs.

He urged that the peace time Petroleum Administration take over all the records of the Petroleum Administration for War and that it perform "a more active function than heretofore." Ickes said that he was depending on President Truman's impending reorganization of the Federal Government to provide him with sufficient personnel and powers to make the Administration a real aid to the industry.

Senate hearings on the Anglo-American oil treaty have been postponed until February 15, at the request of Senator Tom Connally, of Texas. Connally hopes to return from Europe by that time, but if he is unable to do so, he was assured by the Senate Committee before he left that hearings would be further postponed. Connally is at present in London as one of the United States delegates to the United Nations Organization.

At his press conference, Ickes also lashed out at Robert W. Kenny, Attorney General of California, and Ed C. Pauley, Democratic National Committee Treasurer and California oil man, for their stand on the tidewater question. Asked about reports that long distance telephone calls were being made over Pauley's phone in committee headquarters in the Mayflower Hotel in Washington, urging support for the tidelands quitclaim legislation now pending before Congress, Ickes said: "It seems to me to be a curious kind of activity on the part of employees or attaches of the National Committee. I would say off-hand that it's none of his damned business anyway."

Discussing a statement prepared by Kenny and Assistant Attorney General William W. Clary in favor of legislation settling the tidelands controversy in favor of the states, Ickes said that the question of states rights had nothing to do with the question.

"The controversy seems to be one of states rights versus oil and in this case it's largely a question of oil," Ickes said. "Kenny is so excited over states rights, as appears to be his chronic state nowadays, that he never mentions that he wouldn't be so upset if oil didn't enter into the problem as the major factor."

Ickes pointed out that only once in the history of the country has a bill been passed by Congress which removed a pending case from the jurisdiction of the Supreme Court. He pointed out that if the bill becomes law, there would be no way to get it to the Court to decide on its constitutionality, since "Congress always has the right to give away any national property."

The Bureau of Mines has just issued a report on methods used in the Elk Basin oil fields to successfully combat hazards of hydrogen sulphide poisoning. As a result of precautionary methods in disposing of hydrogen sulphide gas by companies operating in the Elk Basin field, not a single serious injury or fatality from hydrogen sulphide poisoning has occurred in more than two years. These methods can be adapted to nearly every oil field in which gas with a high content of hydrogen sulphide is produced with the oil, according to the report.

Sale of the Big and Little Inch pipelines for use to transport natural gas from Texas to the East Coast should only be done as a last resort, Surplus Property Administrator Stuart Symington has recommended in a report to Congress.

Symington told Congress that every effort should be made to either sell or lease the two giant oil pipelines, built during the war emergency, to private oil companies for the peacetime transportation of crude and refined products to the midwest and the Eastern seaboard.

"Disposal for conversion to natural gas will be favored only if it proves impossible to keep the lines in petroleum service and the national security is otherwise adequately protected," he said.

Possible transformation of the two lines has aroused a storm of controversy. Led by Senator W. Lee (Pass the biscuits Pappy) O'Daniel, of Texas, many state authorities feel that the gas should be retained in Texas in order to attract industries there, rather than shipping the gas to other industrial centers. Proposed use of the lines for natural gas transportation has also drawn the opposition of the United Mine Workers, the National Coal Association and the railroads.

However, in spite of Symington's recommendations, no single oil company or group with sufficient backing has shown any interest in acquiring either of the big lines. Major interest in them thus far has been from groups planning to convert them to natural gas lines.

Following the Surplus Property chief's report to Congress, a number of oil executives in the Eastern states said that there had been no change in opinion within the industry since last year when 17 petroleum refining and pipeline companies joined in making a recommendation that unless the lines were converted to natural gas they should be held as a "military asset".

It was pointed out that the main difficulty with private operation of the lines would be to get enough oil to make use of them at a profit. Not even a major company could provide enough oil to keep them in operation, it was said.

Symington strongly intimated that he might recommend that the two lines be operated by the government as petroleum carriers before he would permit them to be used as natural gas carriers.

"Public operation on a full cost basis may have to be considered if all efforts to dispose of the lines to private industry fail," the report said. This suggestion came ahead of his statement regarding last resort conversion of the lines to gas transportation.

Development of Employee Training Program

by OSCAR COOK and
HAROLD P. SAUERESSIG
Southern California Gas Company.

ABSTRACT:

This paper discusses development and application of the employee training program in the Southern California Gas Company operations.

Emphasis is placed upon the utilization of training manuals, W. M. C. Job Instructor Training, motion pictures and other training media and their application to problems encountered in Butadiene Plant operation.

Utilization of proven training principles has resulted in development of effective operating and maintenance organizations during a period when availability of experienced labor was limited.

The Southern California Gas Company has the responsibility of rendering a dependable gas fuel service to approximately 879,000 meters in Southern California. The gas company sells a service. Gas as the fuel is the instrument of this service. The convenience with which it is used and the comforts that can be obtained from its use in the home is the service that the customer buys. The welfare of this utility then depends upon maintaining an adequate supply of this fuel at all times and to make certain that the fuel is efficiently utilized within the homes.

Customer Service Department

A study of gas appliance adjustments which were made by several hundred servicemen of the Customer Service Department while completing 2,000,000 annual customers requests for service, disclosed that numerous adjusting techniques had been applied on the customers gas equipment. The servicemen were not applying their skills in a uniform and standardized procedure and in consequence uniform service was not always rendered.

Employee Training Staff

Accordingly, over 10 years ago, an Employee Training Staff was created within the Customer Service Department of the Southern California Gas Company. The function of this staff was to present an approved training program to the servicemen then employed and to prepare new employees to be accredited servicemen of the department in the shortest period of time.

This program was set up to train uniformly three classifications of employees of the Customer Service Department in the completion of meter installations and the mechanical adjustment of gas burning equipment. It was developed to the point where each employee would receive both classroom and field training which was scheduled so that the programs would be from the simplest operations of the assignment to the more complex.

Apprenticeship Principle

This was accomplished by following the apprenticeship principle of training, i.e., assigning the new employees to various jobs. This type of training gave the new employee a useful background, but the progress was too slow and the complications resulting from assigning the employee into various departments made this type of training impractical.

Training With Old-Time "Experts"

To correct the faults of this method "trainees" were assigned as helpers with old-time "experts." However, it was later learned that these individual "experts" had work habits which were not always desirable to pass on to the new employee. It was also learned that the well-qualified "experts" were not necessarily good instructors, and the quality and quantity of the instructions given to individual students varied widely.

Training With Qualified Instructors

Well qualified instructors were introduced into the program at this time to assure uniform training. This marked the beginning of a new trend in training. Prior to this time, the student had only been in contact with a variety of information, whereas instructors circumvented this weakness by presenting material from prepared lectures. The resulting standardization made it possible for management, and supervision, to exercise a greater degree of control over the program. With instructions issuing from one source, it became possible for these groups to indicate within closer limits the information they wished released to employees.

Lecture and Demonstration

These lectures covered the funda-

Fig. I

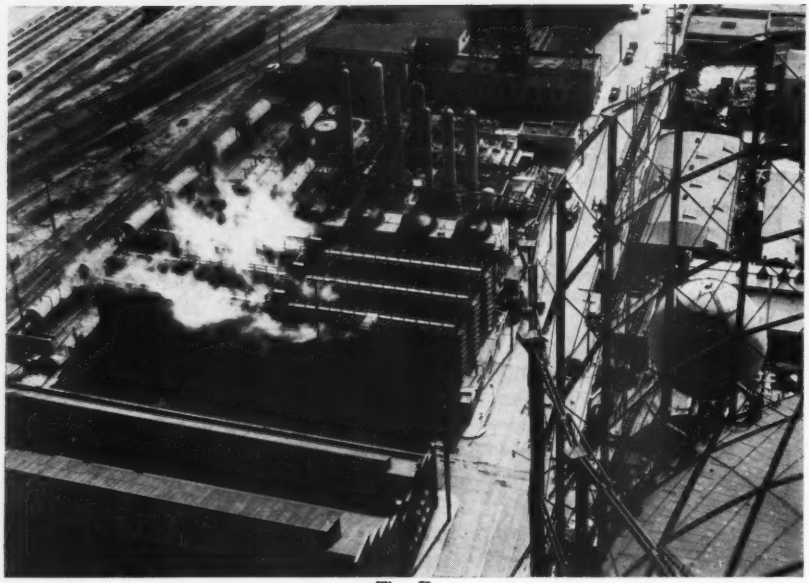

Fig. II

mental principles of combustion and the operation of gas appliances. In these lectures cut-away models of various gas appliances were demonstrated. This was followed by discussion and demonstration, using complete operative assemblies, to establish the relationship of all integral parts.

Classroom Equipment

Small groups were found to be desirable and lecture rooms of suitable size were provided. These rooms were adequately equipped with motion picture and lantern slide projectors, screens, blackboards, desks, chairs, etc.

Photostatic enlargements, mounted operative equipment, cut-away models were also utilized, not only for atmosphere but for providing solid background.

The manufacturers of appliances and controls were very cooperative in this program, particularly in the furnishing of models, supplies and lectures.

Results Obtained From Training Employees

By applying the "Training Within Industry" techniques, the instructors have eliminated needless repetition; learning has been hastened, however, with the assurance that the employees have a complete understanding of the principles when the jobs were broken down into their component parts; the lecture material used has been standardized; the classroom presentations have been standardized and uniformly presented; a greater uniformity in the interpretation of company policies has been obtained following the distribution to the new employees of manuals which include approved policies and procedures.

The training program originally required 120 days to complete a prescribed training course. The development of the program produced steps of refinement which resulted in an integrated program and progressively reduced the period of training to 90, then 80, then 40, and at the present time, to approximately 30 days.

Butadiene Production Department

Though the Employee Training Staff was established primarily to train Customer Service Department servicemen, it was not restricted in its endeavors and conducted classes for other departments that called for this service. For the past two and one-half years, the Staff has rendered a training service to the Butadiene Production Department, the newest department of the company. This department has the responsibility of producing butadiene, and other products, which are used in the manufacture of synthetic rubber.

Brief History of the Butadiene Production Department

In the spring of 1942, the Southern California Gas Generating Plant at Aliso Street in Los Angeles was selected by the Rubber Reserve Company for conversion to the production of butadiene for synthetic rubber.

The gas generating plant, prior to this war-time assignment, had normally operated actively only three winter months of each year as a stand-by gas manufacturing plant for the Company. During these winter months the gas manufactured in the large "cracking" generators supplemented the natural gas supplied to approximately 879,000 customers in the Company's system.

A large portion of the existing gas generators, steam generating facilities, steam compressors, hydrogen sulfide removal equipment, gas and fuel oil storage tanks and gas lines were used in the new project. This equipment represented an original investment of $7,000,000, and to this was added water treatment units, steam plant boilers and a superheater, oily condensate removal units, a 4800 H.P. gas-engine-driven compressor plant, and absorption plant of 59 million cubic feet per day capacity.

These additions were planned by the Management and Engineers of the Southern California Gas Company in cooperation with the Office of the Rubber Reserve Company. Development work was carried out with the guidance of Reserve's technicians and was facilitated by the exchange of technical information through the office of Rubber Reserve Company. On June 19, 1943, the Aliso Street Plant started the production of butadiene gas.

The project in its entirety covers, with all of the aforementioned items added, over a mile in length. The northern section of the plant is shown in Figure 1.

This view, looking north, shows a part of the plant. Included in this illustration are seven of the eight plant units.

In the far center background is the Tank Farm, By-Product Storage, and Dehydration Plant which

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But that's not all. After the equipment is installed on the well, the pressure-tightness of *each* pack-off and weld is pre-tested to full rating as described below. In California fields suitable test equipment, together with the supervision of experienced personnel, is provided. But the methods are so simple that operators themselves can readily make the same pre-production test in other localities. Not only are *all* packings fully pre-tested *on the well*—but also the welds by which the assembly is attached are also completely tested.

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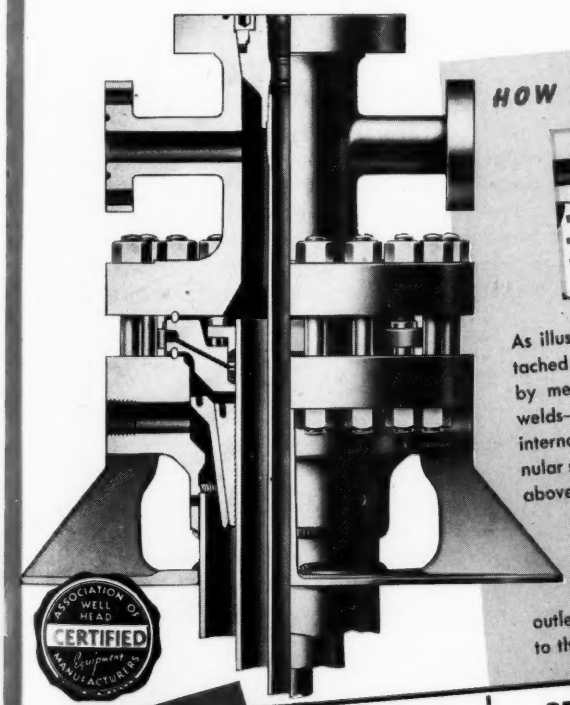
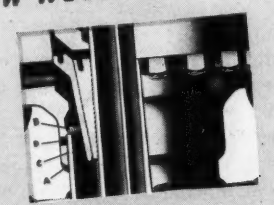
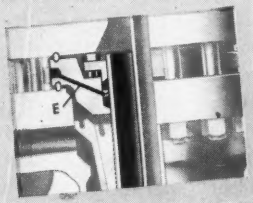
Think what savings this Baash-Ross feature means. Yet this is just *one* of SIX major advancements engineered into the new Baash-Ross Casing and Landing Head equipment. Before purchasing *any* well head equipment it will pay you to investigate the *multiple* savings and advancements you get from Baash-Ross. Call your nearby Baash-Ross representative... or write direct!



ASSOCIATION OF WELL HEAD EQUIPMENT MANUFACTURERS CERTIFIED

HOW WELDS AND PACK-OFFS ARE PRE-TESTED





As illustrated above, the casing is attached to the Baash-Ross Landing Base by means of two full circumferential welds—an external weld (A) and an internal weld (B). This leaves an annular space (C) which is sealed off both above and below by the welds. Two threaded outlets (D) connect this annular space to the outside surface of the Base so that a pressure gauge can be connected to one outlet and a hydraulic pressure pump to the other. Then, by simply applying high pressure to the annular space and noting from the gauge whether or not the welds hold the pressure, both welds are *simultaneously tested for tightness.*

A similar arrangement is engineered into each of the pack-off assemblies in the head. Two full circumferential packing rings are provided at each packing point and the space between these two packing rings is connected to outside ports by means of two channels (E). By connecting a pressure pump to one of the ports and a gauge to the other, both upper and lower packing rings are simultaneously tested for complete pack-off. It's as simple as that!

Another point to remember is that these ports have the further advantage of permitting quick and easy sealing of any leaks that might develop during the entire life of the well. If leaks develop at either the welds or the packing points, simply connect a pressure gun to one of the ports and fill the annular space with plastic packing. *No need to kill the well or even break connections!*

THE OTHER FIVE

TO SOLVE CASING AND LANDING HEAD EQUIPMENT

CELLAR-SAVING COMPACTNESS
...that cuts over-all height to a minimum without sacrificing strength or safety of assembly!

PERPETUAL PRESSURE CONTROL
...quick plastic pack-off anytime without breaking connections or killing the well!

WIDE-RANGE VERSATILITY
...readily adaptable to any number casing strings—any type of tubing suspension!

QUICK EASY INSTALLATION
...base and casing head unitized, handling of drilling riser simplified—and other features!

COMPLETE INTERCHANGEABILITY
...hook-ups and suspensions readily interchanged. All fittings and dimensions API throughout!

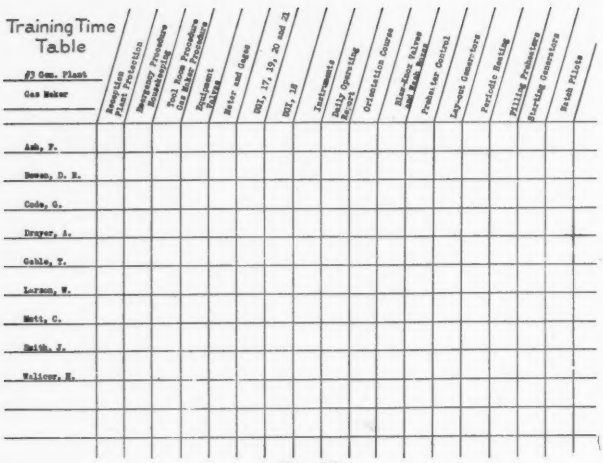


Fig. III

are located behind the No. 20 Water Seal Type Holder. In the right center are shown the Steam Plant, the Generating Plant, the Stripping Plant and the H_2S Purification Plant.

The Steam Compressor Plant, the Gas Engine Driven Compression Plant, and the Absorption Plant are shown in Figure 2.

This view looking south, shows the lower section of the plant which is about a quarter of a mile in length. The Steam Compressor plant is shown in the lower left hand section, while the Jackson Street Gas Engine Driven Compressor Plant is shown in the right center. In the center background is the Absorption Plant.

Plant Operation

The gas generators thermally "crack" 18,000 barrels of feedstock per day to produce 50,000,000 cubic feet of gas, containing butadiene, which is cooled, scrubbed, purified and stored temporarily in a gas holder.

After cooling and processing for H_2S removal the gas is compressed to 50-lb. gauge pressure by four 2780 H.P. steam driven compressors. The gas engine driven compressors, which total 4800 H.P. compress the gas from 50-lb. gauge pressure to 200-lb. gauge pressure. The Absorption Plant operation, which processes this gas, results in combined output of 150,000 gallons of valuable products per day.

Need for Training

It was readily apparent that, virtually overnight, it was necessary to prepare and institute a training program for 650 employees in order to provide skilled people for this important unit of the local synthetic rubber program.

The department had had a normal operating force of 150 employees, which was to be increased by 500+ new employees. This additional force was to be made up from skilled and semi-skilled, male and female applicants for 58 separate job classifications.

It was imperative that the jobs, the correct interpretations of the company policy, etc., be taught to all the employees of this composite department in the shortest possible time.

Among the jobs handled, the following were: draftsmen, welders, typists, painters, oilers, engineers, auditors, instrument repairmen, gas makers, absorption plant operators, together with many others.

Developing a Training Program for the Butadiene Production Plant

In order to provide competent operating and maintenance staffs for this project, it was first necessary to decide upon the scope of the training program. When the problem was first investigated, it was found, as anticipated, that there were significant differences of opinion among the supervisors concerning the job duties of the employees.

A decision of management, uniformly understood and accepted by participating supervisors, was reached following the establishment of job duties.

General Information for Employees

As mentioned, the personnel of the department was, within a comparatively short time, increased from a normal complement of 150 to 650 employees.

Due to the size and complexity of the entire project, it was found essential to provide first of all a booklet which would serve as a guide to the employees to assist them in becoming acquainted with the various departments in the shortest possible time. A small pocket sized booklet entitled "General Information for Employees" is distributed to each employee. This manual includes general information

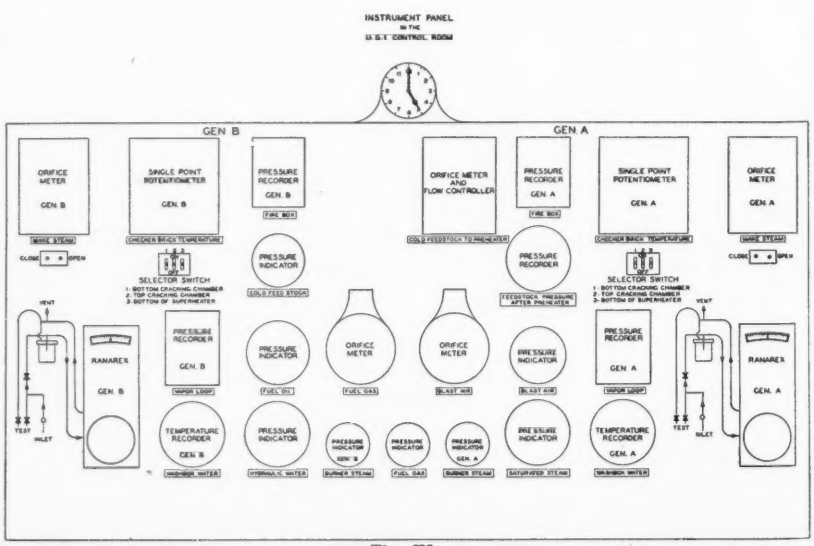


Fig. IV

relative to the plant, i.e., conduct on job, pay-day, working hours, shift schedules, reporting absences from work, parking facilities, and other information which is helpful to new employees in the plant.

Safety: Prior to assuming his duties the new employee receives general information pertaining to safety from the Plant Safety Engineer. These instructions, introducing the new employees to the plant safety program, are given to small groups in the privacy of the Plant Safety Engineer's office and emphasize the point that safety is a requisite of the job. The Butadiene Department provides safety equipment, devices, guards and an effort is made in these first instructions to educate the employee in safety.

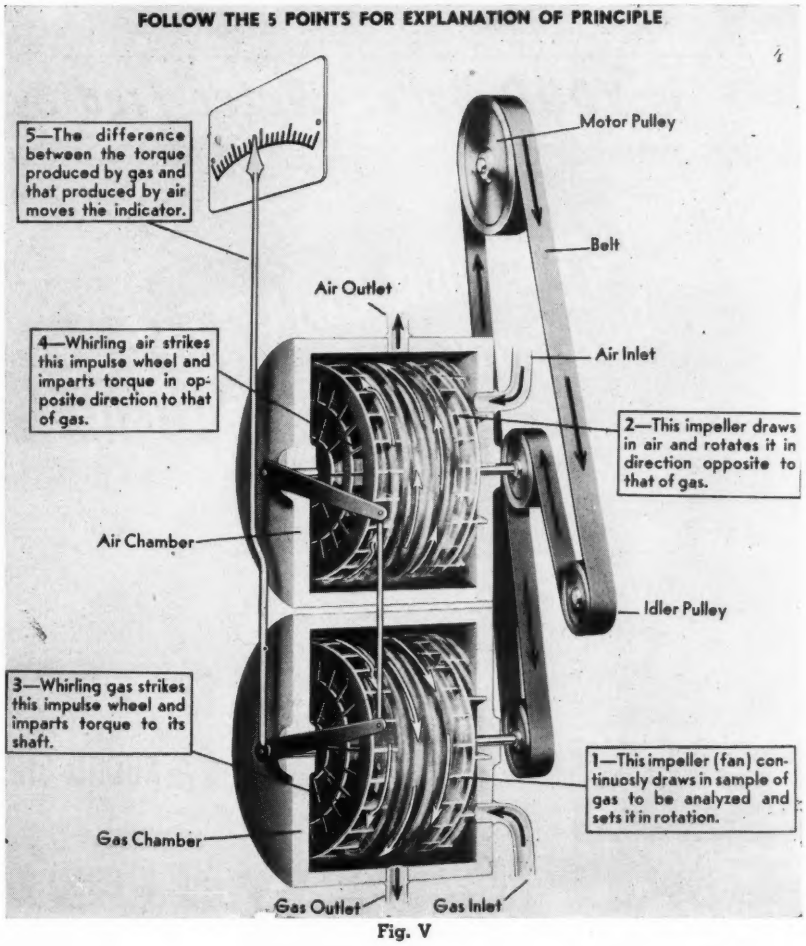
The remarks of the Safety Engineer are limited to an outline of accident prevention policy, employee safety responsibility, safety equipment available for use, procedure in case of fire or accident, and a mention of certain general hazards. It is explained further that definite on-the-job instructions and training in safe work practices are a continuous effort on the part of the supervisors to maintain safe working conditions within the plant.

Orientation Course Manual

An Orientation Course manual has been prepared and a lecture is given to the new or transferred employees as soon as possible after they start to work in the plant. This lecture, which is conducted by an Employee Training staff instructor who is well acquainted with general operation of the plant, is given to groups of about eight or ten employees.

During the lecture, an effort is made to gain the new employee's interest and thus make him more content on the job. Department records show that this phase of the program has assisted in holding labor turn-over to a minimum.

This lecture presents a picture of the geographical organization of the Southern California Gas Company. Included are its various headquarters and departments, policies, method of operation, responsibilities to its customers and a general overall background. This lecture is given primarily to enable the new employee to fix his position in the scheme of the plant's operation. During the tour through the plant, which follows the classroom lecture, the instructor discusses and identifies each of the eight separate departments and clarifies the employees' relationship with the entire project.


FOLLOW THE 5 POINTS FOR EXPLANATION OF PRINCIPLE
5—The difference between the torque produced by gas and that produced by air moves the indicator.
Motor Pulley
Belt
Air Outlet
4—Whirling air strikes this impulse wheel and imparts torque in opposite direction to that of gas.
Air Inlet
2—This impeller draws in air and rotates it in direction opposite to that of gas.
Air Chamber
Idler Pulley
3—Whirling gas strikes this impulse wheel and imparts torque to its shaft.
1—This impeller (fan) continuosly draws in sample of gas to be analyzed and sets it in rotation.
Gas Chamber
Gas Outlet
Gas Inlet
Fig. V

"Orientation Course" manuals are distributed to the employees at the end of the tour with the suggestion that they read it carefully and thoroughly in order that they may correlate the data heard in the lecture with the contents included in the booklet. To date, approximately 800 employees have attended this lecture and have made the personally conducted tour through the plant.

Current Butadiene Production Department Training Program

Instruction manuals for various units of the plant have been prepared. These manuals are based upon a standardized pattern which includes a description of the unit, its function in relation to the entire project and the equipment installed. Job Breakdowns for each classification involved, which are prepared by the unit supervisor in collaboration with the Employee Training staff, are included as supplementary material to the manuals.

Employee Training Procedure

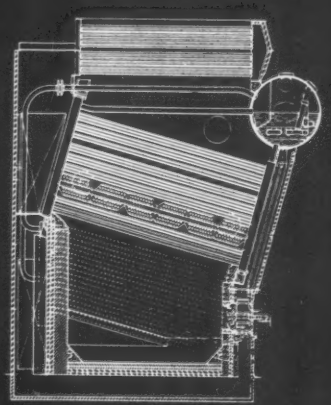
Upon receiving his job assignment, the new employee receives from the supervisor, a manual for the plant unit in which the employee is to work. For the benefit of this discussion, let us assume that the new employee is to be trained to be a Gas Maker in the No. 3 generator plant where butadiene gas is made.

The supervisor referring to the Time Table, for this assignment, conducts the first step of the train-

is YOUR Boiler-Water Treatment Complete?

No. 1 in a series of advertisements on the requirements for the COMPLETE conditioning of boiler water.

here's what COMPLETE boiler-water treatment MUST include:



1 SOUND CHEMICAL TREATMENT

2 A GOOD ORGANIC COAGULANT

3 SIMPLE BUT SCIENTIFIC CONTROL

4 COMPETENT SERVICE and INSTRUCTION

The most able engineer cannot be expected to know all the "ins and outs" of Boiler-Water Chemistry — but any engineer can make certain that boilers are free from scale, corrosion, wet steam and waste by using a system of boiler-water conditioning that meets THESE FOUR fundamental requirements.

Settle down to sound operation with AMEROID — the COMPLETE Boiler-Water Treatment.

Incomplete boiler-water treatment can be VERY costly . . . if you are not sure that your system of boiler-water treatment is COMPLETE, talk it over with the DREW Man—there's no obligation!

AMEROID

The COMPLETE Boiler-Water Treatment

E. F. DREW & CO., Inc.

15 East 26th Street, New York 10, N. Y.

Representatives in Key Cities in United States and Canada

JOB BREAK-DOWN SHEET FOR TRAINING MAN ON JOB

PART Instruments OPERATION Ranarex

IMPORTANT STEPS IN THE OPERATION Step: A logical segment of the operation when something happens to ADVANCE the work	KEY POINTS Key point: Anything in a step that might Make or break the job, Injure the worker, Make the work easier to do, i.e., "knack," "trick," special timing, bit of special information
1. Purpose: To determine specific gravity of gas produced.	a. Specific gravity is a measure of operating conditions in generator. b. Used to control process.
2. One instrument for each generator shell is mounted on instrument panel in control room.	a. Each generator shell can be controlled according to gravity shown on individual instruments.
3. Maintain gravity specified by operating instruction sheet.	a. To raise gravity: this may be accomplished by two methods: 1. Decrease the fuel gas rate if vapor rate is at desired production 2. Increase the vapor rate if the going operating rate is below desired production rate.
	b. To lower gravity: This may be accomplished by two methods.
	1. Increase the fuel gas rate if vapor rate is at desired production rate, or 2. Decrease the vapor rate if going operating rate is above desired prod.
4. Read and record Ranarex scrubber water temperature.	a. Thermometer located at Ranarex gas scrubber on second floor at gas outlet line from wash box. b. Record hourly on Daily Shift Operating Report.
5. Correct gravity for change in scrubber water temperature.	a. See Table 1 on following page. b. Same gas shows different gravities at different scrubber water temperatures. c. Must be corrected to one common or base temperature.

Fig. VI

JOB BREAK-DOWN SHEET FOR TRAINING MAN ON JOB

PART Instruments OPERATION Ranarex

IMPORTANT STEPS IN THE OPERATION Step: A logical segment of the operation when something happens to ADVANCE the work	KEY POINTS Key point: Anything in a step that might Make or break the job, Injure the worker, Make the work easier to do, i.e., "knack," "trick," special timing, bit of special information
6. Average and record gravity readings 1. Maximum average gravity during hour.	a. Record on daily shift operation report 1. Average is obtained by taking average of:
	a. The highest maximum point reached during any "make" period, and b. The highest minimum point reached during "make" period.
2. Minimum average gravity during hour.	a. 2. Average is obtained by taking average of: a. The lowest maximum point reached during any "make"
	b. The lowest minimum point reached during "make"
7. Change Charts.	a. Change at 6:00 a.m., 2 p.m., and 10 p.m.
	b. Use chart with correct shift number, date, and generator no. c. Set chart on correct time. d. Take care that Ranarex mechanism is not damaged while chaning charts
8. Ink pens.	a. Use red ink.
9. Chart turns by electric clock.	a. No winding necessary.
10. Report operating difficulties to Production Engineer or Chief Gas Maker.	
11. Do not attempt to make repairs or adjustments on Ranarex instruments.	a. Ranarex has delicately adjusted mechanisms. b. This service provided by Instrument Department.

Fig. VII

ing of the new employee.

The Time Table sheet is shown in Figure 3.

This Time Table includes twenty-one separate phases of this assignment from the less complex to the most specific requirements. The immediate supervisor is responsible for certain phases of training which do not require classroom instructions. When the new employee has advanced to that point where classroom training is necessary, he is then assigned to the Employee Training Staff for this instruction.

For the benefit of this discussion, let us assume that he has progressed to the point which is listed as Instruments on the Time Table. It is necessary at this time to have a complete understanding of the instruments which are installed on the Control Panel in the Gas Makers Control Room. This panel contains seventeen meters, gauges and other instruments, all of which are essential in the efficient production of butadiene gas.

The control panel is shown in Figure 4.

This illustration shows flow meters, potentiometers, pressure recorders and many others. Again, let us assume that the immediate supervisor has given all the required training on the installed meters and gauges with the exception of the Ranarex. This instrument records the specific gravity of the gas produced in the thermal "cracking" process, and the butadiene yield of the plant in a large measure, is predicated upon the readings obtained from this instrument. To familiarize the new employee with the accuracy, sensitivity, function, operation and to some degree, the maintenance of this instrument, he is assigned to the Employee Training Staff for specific classroom instruction.

Principle of the Ranarex

The training procedure for this instrument follows the standard established using operative instruments whenever possible, or cutaway or disassembled units. To facilitate learning of the nomenclature of the instrument detailed diagrams are reproduced into slides and projected upon a screen.

A typical slide is shown in Figure 5.

This slide is an illustration of a Ranarex with portions of the instrument removed, to show the principle of weighing the "cracked" gases in relationship to air. Learning is facilitated by the use of flow arrows and descriptive detail in the explanation of the operation of the instrument.

During this period of instruction, the Job Breakdown sheets are used. The Job Breakdown sheet for the Ranarex is shown in Figures 6 and 7.

The Job Instruction Training Program, sponsored by the War Manpower Commission, demonstrated that supervisors could be effectively used in training employees when given sufficient assistance.

The supervisors, however, do not carry the entire load. The Employee Training Staff helps in the organizing and planning of the training program. The text material is prepared in written form by a selected group of employees within the Butadiene Plant, thus assuring uniform coverage of all points. This arrangement places responsibility upon this group and the Employee Training Staff for keeping the training program abreast of operating procedures.

GAS MAKER'S CHECK SHEET

	Satisfactory	Needs more training
1. Preheaters		
a. Principle of operation		
b. Control of heat		
c. Control of Feedstock		
2. Water Circuit		
a. Washbox function and operation		
b. Seal Pot function and operation		
c. Normal water temperatures		
3. Generator Operation		
a. Principle of "cracking" process		
b. Operation of U.G.I. Automatic Controls		
(1) #17, 19, 29, and 21		
(2) #18		
c. Operation of Blaw-Knox valves		
d. Operation of Blast Air System		
e. Operation of Fuel System		
f. Operation of Steam System		
4. Instruments		
a. Operation of Ranarex		
b. Operation of Recording thermometers		
c. Operation of Recording Potentiometers		
d. Operation of Recording Pressure Gauges		
e. Operation of Indicating Pressure Gauges		

I have checked_____, Gas Maker, and the above remarks indicate my opinion of his work.

(Signed)_____
Operating Foreman

Fig. VIII

Checking Results of Training

Following the meeting or meetings the employees are checked at periodic intervals to determine the degree of their understanding of their respective assignments. This information is recorded on check sheets which are prepared by the supervisors of the respective plant unit, assisted by the training personnel. These check sheets are used by the Plant Foremen or equivalent supervisor in judging the completeness of the employee's understanding of his job assignment.

The gas makers check sheet is shown in Figure 8.

Visual Education Through Use of Motion Pictures

Since it is not always feasible to provide operative and cut-away models of equipment in the lecture room for demonstration purposes, sound motion pictures directly applicable to numerous phases of the project, have been shown to good advantage.

Fire Prevention

To emphasize the importance of Fire Prevention, sound motion pictures explaining the principles of causes and the prevention of fires have been presented to nearly all combustion, demonstrating the employees of the plant.

General Knowledge of the Use of Butadiene

As the newest department was in a field far removed from the original purpose of the plant, sound films were shown to operating supervisors, laboratory technicians and gas makers to generally acquaint them with the use of butadiene. The sound film, "Winning the War of Synthetic Rubber" showed the development of the Government synthetic rubber program, its production and the various uses and fabrication of the finished product. Another sound film entitled "Bouncing Molecules," using the Tinker Toy principle, demonstrated the laboratory production of synthetic rubber.

Tools

In order to assist the Maintenance Department in the training of a force of skilled and semi-skilled employees in the use of tools, a sound motion picture of this subject was shown. The film adequately demonstrated the proper use of the correct tool. After having seen this film, the employees of this Department showed a marked interest in choosing the proper tool for their respective job.

Equipment

To assist the Maintenance Department in establishing a correct procedure when requisitioning supplies from the Stores Department, sound motion pictures were utilized, in regularly programmed meetings, which covered the basic principles of steam, its power and use in turbines and condensers, electricity and electronics, and pipe equipment. By the introduction of animated characters or moving flow diagrams, these motion pictures standardized titles for the pieces of equipment necessary for replacement in the Maintenance assignments, and were effective in minimizing the delays which could be occasioned by improper interpretation of the data requested in the requisitions.

Summary

The task of training those who are hired is just as important in industry today as is the task of hiring proper workers.

Regardless of the type of background or preparation any newcomer may have had the demands of an organization are peculiar to it and necessitate the acquisition of the skills which the particular job imposes on the employee. Introducing the novice to his new job and anticipating a below-average production during the introductory period are the accepted obligations of any supervisory force, however, it can be minimized only by an adequate training program.

Training is no longer limited to the novice; it extends through the entire company. Some of this training is simple in nature because of the limited duties of the workers, while for others training covers highly technical subjects in great detail.

The training program established in the Butadiene Plant gave opportunities for the development of each worker at the same time that heavy production demands were required. Training facilities were made available for all levels of workers including the beginner, the average work-

(Continued on Page 31)

Utilization of Propane and Butane

By M. M. PERKINS
Process Engineer
M. W. Kellogg Company

Within the last three or four years, there has been tremendous changes in refining methods. These changes reflect themselves back to the natural gasoline industry. Let us list a few of the changes that have occurred in refining.

In the first place, catalytic cracking has become a very widely used process. Similarly alkylation is now a process which is widely practiced. Butane isomerization is another new process. A characteristic of these newer processes has been the production of relatively large quantities of gas as compared to gasoline and the production of gasoline that is relatively highly volatile. In other words, the use of natural butane in refined gasoline blends is probably going to decrease as time goes on, so that other uses of propane and butane must be developed.

Another factor which we all must bear in mind, particularly in connection with economic studies of various processes, is the fact that crude oil is still one of the cheapest raw materials available to any industry on a weight basis; the cost figure is rather interesting—crude oil is worth about half a cent a pound. In other words, crude oil is very, very cheap material—almost as cheap as many minerals. And in the course of the following studies, I think it is well to keep in mind that cost per pound figure, because propane and butane, while they are low in cost per gallon, on a weight basis, they are not so cheap. So the natural gasoline refinery will always be faced with that cheap competitive raw material, particularly in motor gasoline manufacture.

Now, the C_5's and heavier components in natural gasoline are now —and probably will be for at least the immediate future—directly useful in refined gasoline blends. The C_4's from a volatility standpoint will probably be progressively thrown out of normal refined gasoline blends, and propane obviously cannot be used directly in gasoline. So the natural gasoline producer is faced with this problem:

"Here I have a large production of propane and butane, and I have spent a great deal of money during the war to help out the Government in producing iso-butane and isopentane, and everything else for the war effort, and what have I now—just a number of tanks full of propane and butane—and what do I do with it?"

There are a lot of things that can be done with propane and butane—at a price.

Among the outlets that could be exploited are synthetic chemicals. Propane and butane themselves are relatively inert hydrocarbons and may be processed through known processes into all kinds of things—plastics, and the whole gamut of the commercial synthetic organic chemicals could be, theoretically, produced from propane, if one wanted to go about the production of these materials from such a starting point.

Another obvious and probably most important avenue for the use of propane and butane will be liquid petroleum gases. Also, propane and butane, obviously, can be used as motor fuels directly.

One further use for propane and butane would be in the manufacture of motor gasoline through the Synthol process. However, under current conditions, this process appears to be economically attractive only with low cost natural gas as the starting material.

Propane and butane can be used as raw materials to produce motor gasoline, and it is this rather unfortunate subject that I chose to explore in this paper.

Our study of methods for the production of motor gasoline from propane and butane have been based on several assumptions as follows:

a. Feed available is 4010 BPSD of butane and 4370 BPSD of propane. These relatively large quantities of feed were chosen in order to be certain that full-scale economical equipment would be used.

b. Plant is located in a new area. Tankage, water supply, utility facilities, laboratories, office building, and similar items are included.

In presenting an economic study of gasoline manufacture from propane and butane, we shall first outline the yield structure for the various unit operations involved: thermal polymerization, catalytic dehydrogenation, etc. The following section will show the economic aspects of several combinations of these basic processes.

The first process to make motor fuel from propane and butane is thermal polymerization. This process is being used in several large-

THERMAL POLYMERIZATION YIELDS **FIG. I**
POLYCO PROCESS
(Ultimate Yield Basis)

FEED	Propane	Butane*	50% Propane-50% Butane*
PRODUCTS—LIQUID VOLUME PER CENT			
Gasoline	41.2	54.3	48.0
Tar	....	2.5	1.3
PRODUCTS—WEIGHT PER CENT			
Gasoline	55.0	66.0	60.8
Tar	....	4.3	2.3
Dry Gas	45.0	29.7	36.9
		100.0	100.0
INSPECTION OF GASOLINE			
Gravity—° API	76.5	69.0	72.2
I.B.P.—°F	92	97	93
10%	110	124	118
30%	119	147	132
50%	130	177	153
70%	155	219	187
90%	245	317	274
End Point—°F	380	401	400
R. V. P.—Lb./Sq. In.	10	10	10
Octane No.—CFR-M Clear	78	77	77.5

*—Butane contains 25 per cent isobutane and 75 per cent normal butane.

NOW *Two* ENGINEERING SERVICES ARE AVAILABLE AT *One* SOURCE

1 . . . SECURITY FLUSH JOINT THREADS

Purchase of the pipe threading facilities of Security Engineering Company, and the acquisition of license under Security patents, now enables Kobe to perform two vital engineering services. You can now get Security flush joint threads cut at the same place you get Kobe pipe slotting service, *and at a saving of time and extra transportation costs.*

Security flush joint threads eliminate couplings . . . provide a flush joint inside and out . . . and permit use of smaller outside casing. Security threads are designed to prevent unnecessary distortion when mated and to produce higher efficiencies in tension, compression, bending and torsion.

2 . . . KOBE SLOTTED PIPE

Continued research and long field experience are back of Kobe's pipe slotting service. Patterns for screen casing have been developed to give maximum production under varying sand conditions. Kobe slots are heat-treated to give added wearing quality to the base metal at the slot-face. This increases resistance to abrasion and lengthens life of the slot. Case-hardening of Kobe slots gives added strength to the pipe. Tests prove that Kobe screen casing retains 95% and more of its original strength. Under-cutting makes slots self-cleaning and avoids clogging. Kobe screen casing is slotted to any required pattern or dimension and to meet any oil sand condition.

SPECIFY KOBE SLOTS AND SECURITY THREADS FOR HIGHER PRODUCTION AND LONGER WELL-LIFE!

KOBE

KOBE, Incorporated—*General Offices,* Huntington Park, Calif., *Division and District Offices:* Oklahoma City and Tulsa, Okla.; Dallas, Odessa, Longview and Houston, Texas; Great Bend, Kansas; Bakersfield, Calif.; New York, N. Y.

Kobe Slots cost less than sand troubles

scale commercial units. The process, where installed, has been a very successful and profitable operation.

The second method of processing the available feed to be studied is catalytic dehydrogenation. Catalytic dehydrogenation is a process that removes a mol of hydrogen from a saturated hydrocarbon to produce an olefin of the same number of carbon atoms.

Catalytic dehydrogenation of propane has never been practiced on a commercial scale. Two foreign installations are using catalytic dehydrogenation of butane, and there may have been more installations in Germany. A somewhat similar process is used to produce butadiene from butylenes and from butane.

The third process studied is thermal pyrolysis. This process is being used on a moderate commercial scale.

Both processes — catalytic dehydrogenation and thermal pyrolysis — produce olefins which, in themselves, are not suitable for motor gasoline. The olefins must, therefore, be combined to synthesize higher molecular weight and higher boiling point hydrocarbons. In this study, the catalytic polymerization and alkylation have been used for the synthesis step.

Yield structures for thermal polymerization of propane and butane are shown in Figure I. Also shown are inspections of the polymer gasoline product. It should be noted that these figures are on an ultimate yield basis; that is, on the feed stock actually disappearing. Economic considerations usually dictate operation at a partial yield—generally 70 per cent to 90 per cent of the figures shown in Figure I.

Catalytic dehydrogenation yield figures are shown in Figure II. These yield figures are based on laboratory data.

Similar yield structures for ther-

CATALYTIC DEHYDROGENATION **FIG. II**
(Ultimate Yield Basis)

FEED	Propane	N-Butane	Isobutane
PRODUCTS	**Weight %**	**Weight %**	**Weight %**
H_2	4.5	4.0	4.0
CH_4	1.0	3.8	5.1
C_2H_4	0.5	4.0	0.4
C_2H_6	5.0	2.2	0.5
C_3H_6	89.0	6.5	6.0
C_3H_8	.....	0.8	1.0
C_4H_8	.....	73.7	80.0
i-C_4H_{10}	.....	.....	.....
n-C_4H_{10}	.....	.....	.....
C5+	.....	5.0	3.0
Coke	.....	.....	.....
TOTAL	100.0	100.0	100.0
Approximate Conversion per Pass	40	25	30
Selectivity	93	76.2	83

THERMAL PYROLYSIS YIELDS **FIG. III**
(Ultimate Yield Basis)

FEED	Propane	N-Butane	Isobutane
PRODUCTS	**Weight %**	**Weight %**	**Weight %**
H_2	1.0	0.5	1.0
CH_4	19.5	15.5	18.5
C_2H_4	23.5	14.0	2.5
C_2H_6	15.5	15.0	2.0
C_3H_6	40.5	32.5	25.5
C_3H_8	.....	5.5	9.5
C_4H_8	.....	17.0	41.0
i-C_4H_{10}	.....	.....	.....
n-C_4H_{10}	.....	.....	.....
C5+	.....	.....	.....
	100.0	100.0	100.0
Approximate Conversion per Pass—Weight Per Cent	20	35	45
Approximate Re-cycle Ratio—Weight Per Cent	4/1	1.9/1	1.2/1

FIG. IV
CATALYTIC ISOMERIZATION OF NORMAL BUTANE

FEED	N-Butane Weight per Cent
PRODUCTS	
C_3H_8 and Lighter	2.0
Iso C_4H_{10}	95.0
C_5	3.0
TOTAL	100.0

Conversion per Pass—40.0 per cent.

CATALYTIC POLYMERIZATION AND ALKYLATION OF PROPENES AND BUTENES **FIG. V**
(Ultimate Yield Basis)

PROCESS	CATALYTIC POLYMERIZATION			CATALYTIC ALKYLATION		
FEED	C_3H_6	C_4H_8	$C_3H_6+C_4H_8$	C_3H_6	C_4H_8	$C_3H_6+C_4H_8$
Isobutane—Wt. %	.....	.....	.....	138.0	103.3	120.6
Olefin —Wt. %	100.0	100.0	100.0	100.0	100.0	100.0
TOTAL	100.0	100.0	100.0	238.0	203.3	220.6
PRODUCTS—WEIGHT PER CENT						
Depentanized Total Alkylate	.....	.....	.....	234.4	182.3	208.4
Isopentanes	.....	.....	.....	.....	15.7	7.8
Sludge	.....	.....	.....	3.6	5.3	4.4
Polymer Gasoline	100.0	100.0	100.0	.....	.....	.....
TOTAL	100.0	100.0	100.0	238.0	203.3	220.6
INSPECTION OF PRODUCTS						
Gravity—° API	59.8	60.4	60.1	71.8	68.1	70.0
I.B.P.—°F	128	148	170	174	143	159
10%	232	221	190	183	200	192
50%	274	244	248	195	225	210
90%	338	346	368	220	249	234
End Point—°F	420	421	431	378	380	380
Octane No.—CFR-M	81.9	84.0	83.0	88	94.5	91.3

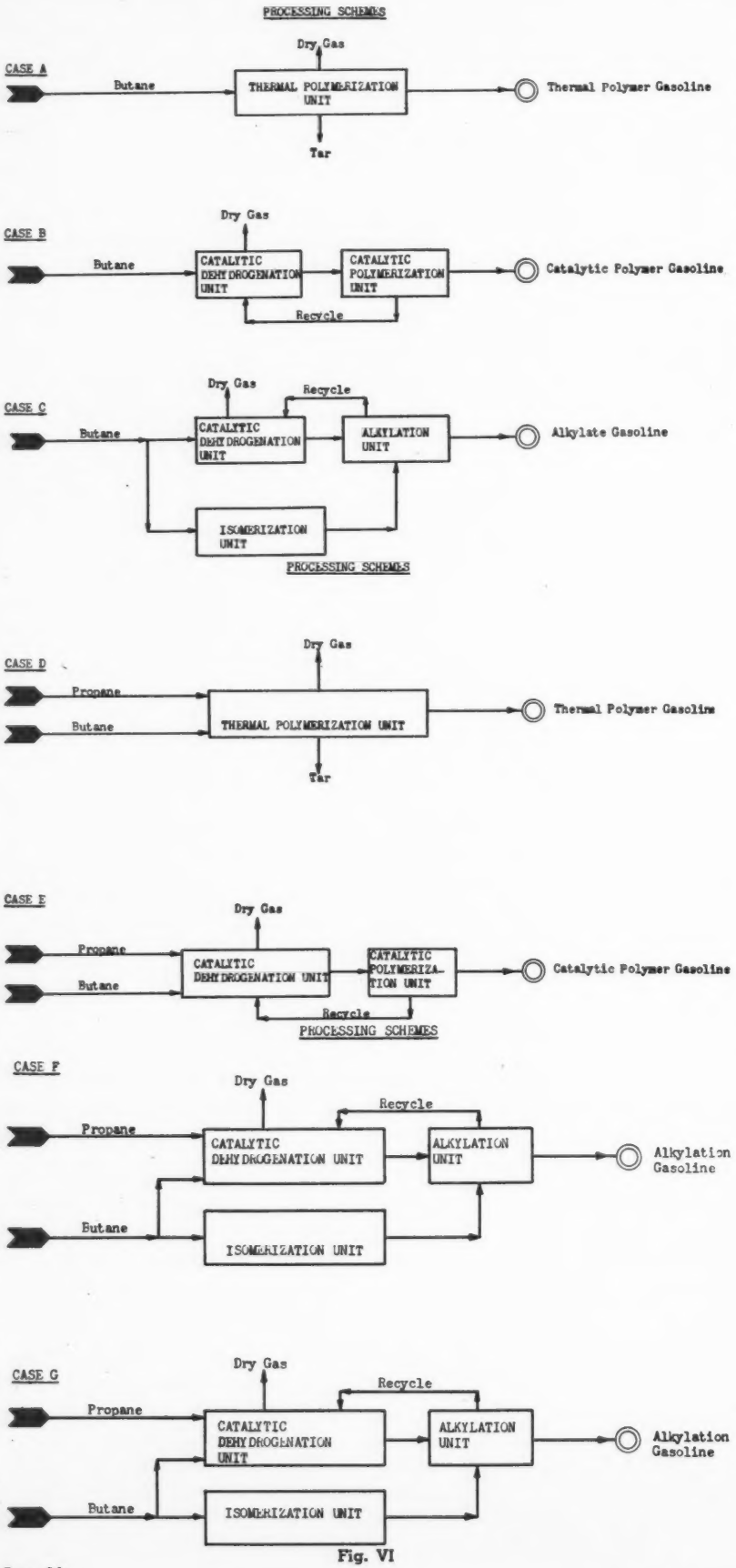


Fig. VI

mal pyrolysis of propane are summarized in Figure III. These yield structures are based on operating conditions of temperature and pressure such that no liquid product will be made. It is interesting to note that pyrolysis of normal butane results in a very low yield of butylene. Propane and isobutane are much more desirable charge stocks in this respect.

To assist in understanding the type of flows which are involved in the economic cases, Figure VI has been made up, which shows the seven processing schemes that have been studied. These various cases may be briefly described as follows:

Case A

This operation is a conventional thermal polymerization operation using butanes as the feed to the unit.

Case B

This case is based upon catalytic dehydrogenation followed by polymerization. The final product from the process is catalytic polymer gasoline. In this case, as in Case A, butane has been chosen as feed stock.

Case C

This operation is based upon a feed stock of butane only. Part of the butane is catalytically dehydrogenated to produce butylenes. The balance of the feed stock is isomerized to produce isobutane. These two stocks, isobutane and butylene, are charged to the alkylation unit to produce alkylate which is the ultimate product of the operation.

Case D

Case D is very similar to Case A, except that both propane and butane are charged to the thermal polymerization operation.

Case E

Case E is very similar to Case B except that both propane and butane are charged to the operation.

Case F

Case F is similar to Case C except that both propane and butane are fed to the unit.

Case G

Case G is similar to Case F except that the quantity of propane

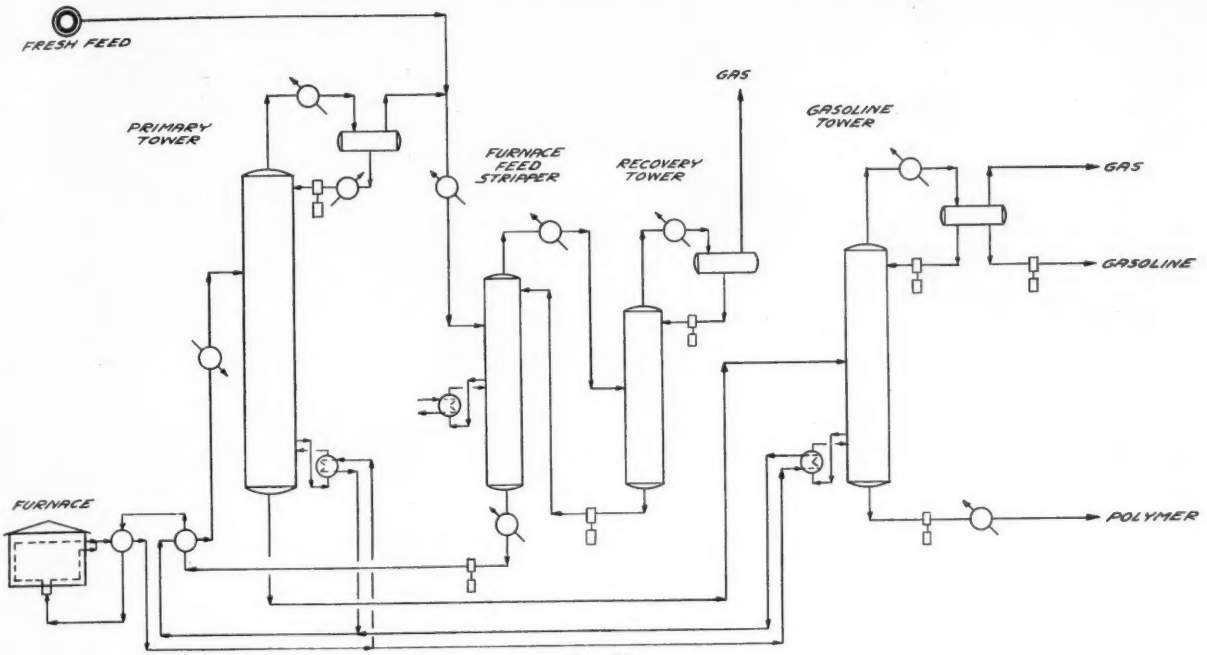


Fig. VII

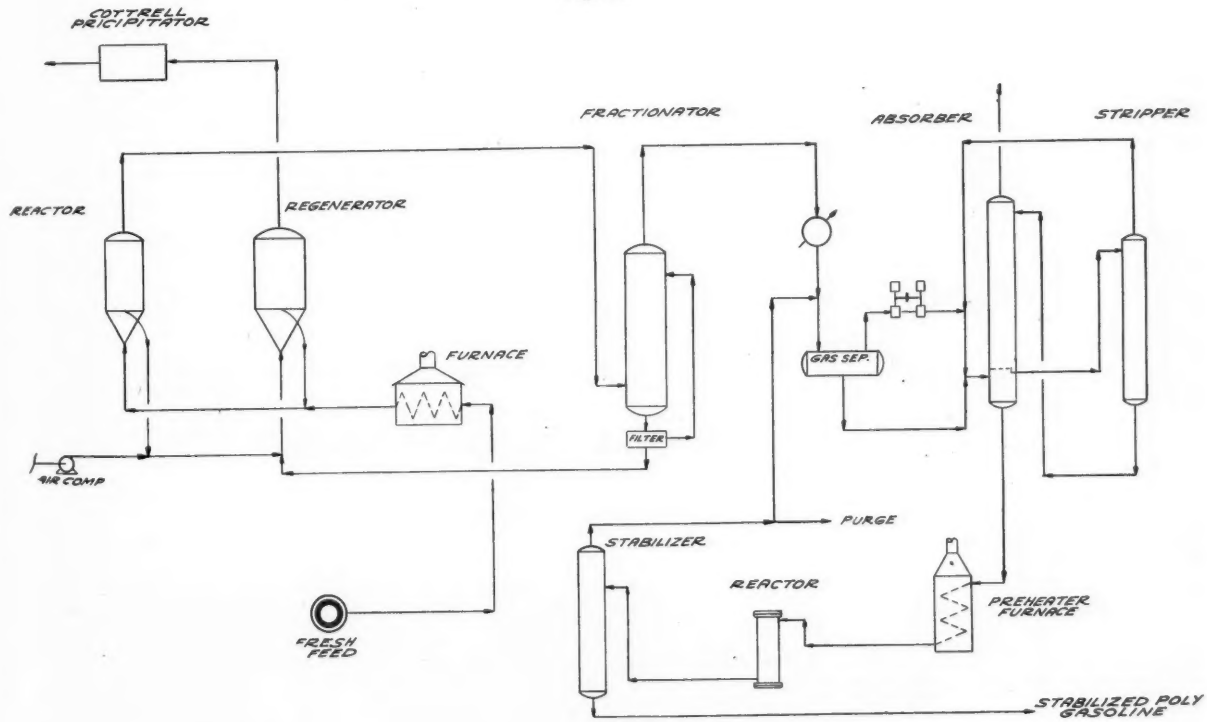


Fig. VIII

in the feed was reduced to approximately half that charged to the unit in Case F. The object of this was to determine whether or not there existed an optimum quantity of propane for the contemplated operation.

To provide a somewhat more detailed concept of the processes Figures VII, VIII, and IX have been included. The thermal polymerization operation is shown in Diagram in Figure VII. This operation is that contemplated in Cases A and D.

In Figure VIII we have summarized the flow involved in catalytic dehydrogenation followed by polymerization. Since the catalytic dehydrogenation process requires that the catalyst be periodically regenerated, we have shown a reactor and a regenerator. The operation of these two vessels is entirely similar

A-2317
THE GOOD OLD ALLOY STEELS ARE BACK IN JORGENSEN'S STOCK AGAIN
A-3141
A-4142
Good News For Alloy Steel Users
Immediately after W.P.B. lifted the limitation order which had restricted warehouses from stocking other than National Emergency Alloy Steels during the war, Jorgensen placed stock orders for the A.I.S.I. (formerly S.A.E.) grades. Shipments against these orders have been, and are, arriving almost daily. While Jorgensen's stocks are not yet up to their pre-war level, they will soon contain larger quantities and a wider range of sizes than ever before.
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Los Angeles — San Francisco — Oakland — Houston
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E-52100
(4130)
AN-QQ-S-684a
(4140)
AN-QQ-S-752a
(x4340)
AN-QQ-S-756a

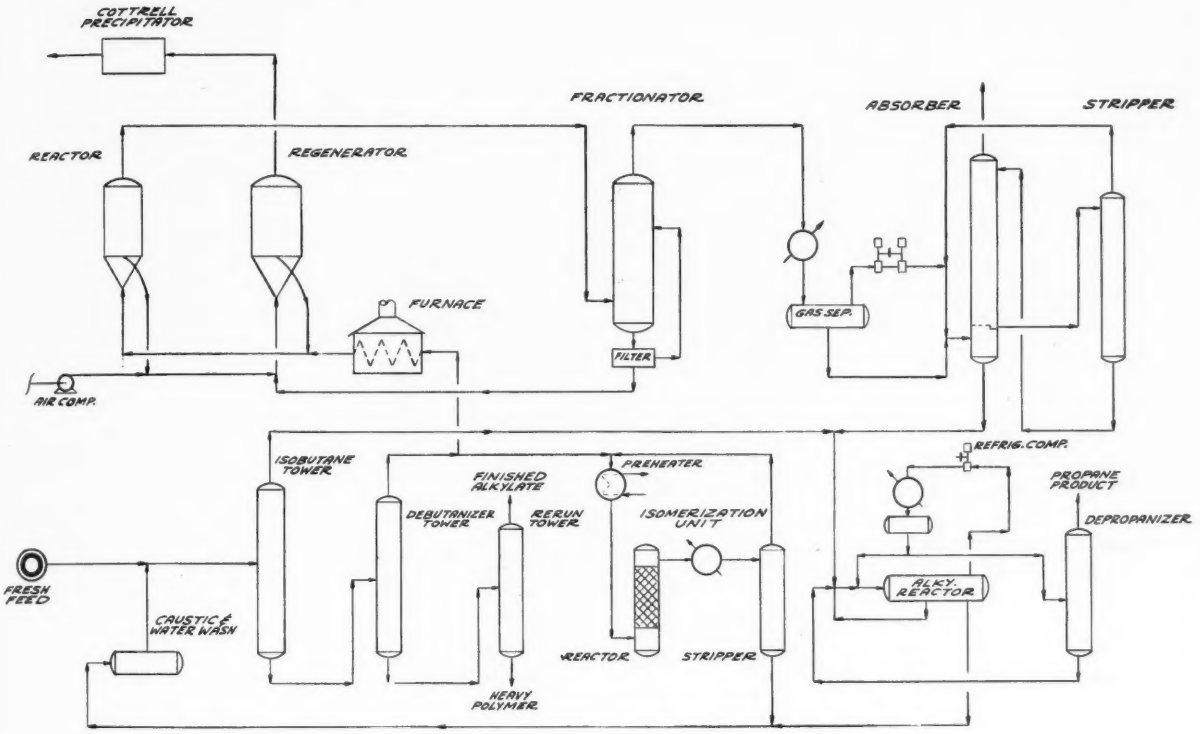

Fig. IX

ESTIMATED PLANT COSTS

FIG. X

	BUTANE FEED						PROPANE AND BUTANE FEED							
	CASE A		CASE B		CASE C		CASE D		CASE E		CASE F		CASE G	
UNITS REQUIRED	Size BPD	Cost−$	Size BPD	Cost−$	Size BPD	Cost−$	Size BPD	Cost−$	Size BPD	Cost−$	Size BPD	Cost−$	Size BPD	Cost−$
Thermal Polymerization Unit	1,745	3,635,000	.....	.....	.....	.....	3,190	7,230,000	.....	.....	.....	.....	.....	.....
Catalytic Dehydrogenation Unit	.....	.....	8,200	2,760,000	5,000	2,210,000	.....	.....	17,000	4,310,000	10,500	3,260,000	7,610	2,660,000
Catalytic Polymerization Unit	.....	.....	1,635	1,244,000	.....	.....	.....	.....	2,800	1,725,000	.....	.....	.....	.....
Isomerization Unit	.....	.....	.....	.....	350	275,000	.....	.....	.....	.....	2,260	710,000	1,255	515,000
Alkylation Unit	.....	.....	.....	.....	2,300	1,380,000	.....	.....	.....	.....	4,500	2,550,000	3,280	2,070,000
Service Facilities	.....	800,000	.....	966,000	.....	965,000	.....	1,150,000	.....	1,440,000	.....	1,415,000	.....	1,483,000
TOTAL		4,435,000		4,970,000		4,830,000		8,380,000		7,475,000		7,935,000		6,728,000

THE M. W. KELLOGG COMPANY
ECONOMICS OF UP-GRADING PROPANE AND BUTANE

FIG. XI

Case		A	B	C	D	E	F	G
Feed Stock	Units	BUTANE			PROPANE+BUTANE			
Processes Used		Therm. Poly	Dehydro+ Cat. Poly	Dehydro+ Isom.+Alky.	Therm. Poly	Dehydro+ Cat. Poly	Dehydro+ Isom.+Alky.	Dehydro+ Isom.+Alky.
FRESH FEED RATE								
Propane	BPSD	.....	.....	.....	4370	4370	4370	2000
Butane	BPSD	4010	4010	4010	4010	4010	4010	4010
Total	BPSD	4010	4010	4010	8380	8380	8380	6010
YIELDS								
Gas	#/Hr.	11740	23000	13500	27450	43700	23600	13000
Excess C_4 above 10#	BPSD	80	.....	.....	80	.....	.....	.....
Gasoline+	BPSD	1906	1635	2258	3587	2795	4483	3280
Tar	BPSD	76	.....	.....	100	.....	.....	.....
Carbon and Sludge	#/Hr.	.....	1690	1700	.....	3320	2750	2000
Investment	$1000	4435	4970	4830	8380	7475	7935	6728
PRODUCTION COSTS	$/Cal.Day							
1. Direct Oper. Cost		1085	2367	2132	1363	3965	4234	3132
2. Feed Stock		3800	3800	3800	6280	6280	6280	4940
3. Interest, Taxes		657x	818	795	1230x	1230	1310	1110
4. Amortization—10%		1210	1360	1325	2300	2050	2180	1850
5. Running Royalties		*	309	331	*	560	705	500
TOTAL		6752	8654	8383	11173	14085	14709	11532
Gasoline Product+	Gals/Cal.Day	73300	62000	85300	134000	105700	169500	124000
Cost/Gal. Gasoline+	¢/Gal.	9.2	13.8	9.8	8.3	13.3	8.7	9.3
GASOLINE INSP.								
Gravity °API		62.0	60.4	69.0	69.9	60.0	69.5	69.3
O.N.—CFR-M Clear		78.5	85.0φ	93.0	78.0	84.0φ	89.0	91.0
Lead Suscept.		0.4	0.4	1.5	0.4	0.4	1.4	1.4
R.V.P.		9.9	1.5	3.5	9.7	1.7	5.4	4.3

*—Used paid-up royalty here because much more favorable than running royalty in this case. "A" Royalty =$435,000; "D" =$780,000.
x—Not including paid-up royalty.
φ—Blending value.
+—Term "Gasoline" here means polymer or alkylate blending component from process units.

to a Fluid catalyst cracking unit. The balance of the process is entirely conventional.

Figure IX substitutes an alkylation unit for the catalytic polymerization unit included in Figure VIII. In addition to the alkylation unit, it is necessary that part of the feed be isomerized so equipment has been provided for this purpose.

In the operation the butane feed is charged directly to the isobutane tower to separate out the isobutane present in the field butane. Normal butane required for charge to the dehydrogenation system is obtained from the alkylate debutanizer tower which is a part of the alkylation unit.

The flow shown in Figure IX is that contemplated in Cases C, F and G.

To establish a basis from which to calculate economic comparisons of the various processes, certain assumptions as to evaluations had to be made. The major assumptions are summarized below:

Fuel Value—8.3 cents per MM BTU
Electric Power—0.5 cent per KWH
Labor—Average Rate—$1.12 per hr.

Approximate plant costs are summarized in Figure X. It should be noted that these costs are based upon preliminary and approximate estimates. For the purpose of the study, however, it is believed that the figures are reasonably adequate. In addition, it should be noted that in every case a substantial investment in outside facilities has been assumed. Based upon the conditions and assumptions which have been briefly summarized in the preceding paragraph, calculations have been made to indicate the overall economics of the proposed installations. In these economic calculations, we chose to evaluate butane at 2.5 cents per gallon and propane at 1.5 cents per gallon. The manufacturing costs for the various cases are shown in Figure XI. In addition the important items making up the costs are also shown in this figure.

It is interesting to note that the manufacturing costs for the various cases, assuming that feed is available at no value, are also relatively high as indicated by the following figures.

Case A	4.02 cents
Case B	7.83 cents
Case C	5.38 cents
Case D	3.65 cents
Case E	7.39 cents
Case F	4.97 cents
Case G	5.31 cents

Generally the results of this economic study indicate that propane and butane under the conditions assumed are not attractive materials from which to manufacture motor gasoline. In these studies we have used large units to avoid any effect of uneconomically small equipment. It may be possible that certain of our assumptions are not completely correct, but in general any adjustments of these assumptions will be small and will probably not affect the overall pictures presented in Figure XI. The manufacturing costs of thermal polymerization gasoline indicate that this process can be applied in those locations where the butane and propane are relatively cheap. Several large installations and one or two small units are in operation and are showing attractive returns on the investment. In all of these installations, however, butane and propane are available at very low cost. In addition, the refinery operations are closely integrated with field operations.

It is probable that in the coming years developments will occur in the catalytic dehydrogenation field which will permit economic dehydrogenation of propane and butane. It is probable, however, that gasoline manufactured from either of these charge stocks will be relatively expensive and probably will not be competitive, except in unusual circumstances, with gasoline made from crude oil.

This paper was presented at the 20th Annual Fall Meeting of the California Natural Gasoline Association.

Oil Companies Announce Plants To Aid Medical Research Work

Houdry Process and Sun Oil Reveal details of two years experiments in hunt for cancer cause.

Responding to the widespread desire of scientists fighting metabolic diseases, Sun Oil Company and Houdry Process Corporation recently announced plans for construction of two plants to produce in comparatively substantial quantities Carbon 13, a rare material found to have great value in biochemical research work.

Revealing research work and experiments conducted during the last two years with this heavy carbon isotope, Arthur E. Pew, Jr., Vice President of Sun Oil Company and Eugene J. Houdry and Arthur V. Danner, President and Executive Vice President respectively of Houdry Process Corporation, in a joint statement announced work on the two plants would go forward at once.

They stated world supplies of Carbon 13 would be increased from 500 to 1,000 times as a result of their program. Houdry Process Corporation is the pioneer research organization in catalytic cracking and other catalytic reactions, particularly in the field of hydrocarbons.

Their statement explained that Carbon 13, used in biochemical research as a "tracer," gives promise of "ranking in importance with X-Ray as a tool of medical science."

"Carbon 13," they asserted, "may be compared to a chemical microscope that makes it possible for the chemist to see and follow chemical reactions in the body, which is not possible with the X-Ray."

This rare carbon is used to probe the secrets of metabolic disease processes, such as cancer, diabetes, hardening of the arteries and heart trouble. Particular efforts are now under way with Carbon 13 to discover the cause of cancer.

Houdry Process has in operation a thermal diffusion plant for the concentration of Carbon 13, producing about one-fourth of a gram per month. This material has been made available without cost to members of the Isotope Research Com-

mittee for distribution to biochemical research institutions.

Carbon 13 produced by the two new plants, which Sun Oil Company will build, "will be made available without cost to qualified, non-commercial biological and medical research organizations whose activities and experience justify such donations," the statement asserted.

The Houdry experiments, the statement explained, started with less than one-half gram of Carbon 13 which cost several thousand dollars to concentrate. The material produced by the Houdry plant costs in the neighborhood of $400 a gram. It is hoped construction of the new Sun Oil plants will bring the cost down to about $40 a gram.

According to the joint announcement a number of distinguished scientists, many of whom worked on development of the atomic bomb, have contributed in one way or another to the Houdry-Sun Carbon 13 project. The work was initiated and carried on by Dr. Aristid V. Grosse of the Houdry organization, assisted by Dr. E. A. Smith, Houdry research director, Dr. Stanley P. Reimann, director of the Lankenau Hospital Research Institute of Philadelphia and others in these two organizations.

Howard G. Vesper Heads California Research Corp.

Election of Howard G. Vesper as president of California Research Corporation, Standard of California's research subsidiary, effective January 1, 1946, has been announced by R. G. Follis, president of Standard.

Vesper succeeds Ralph A. Halloran, one of the oil industry's best known research directors, who is retiring after 26 years spent as head of Standard's research activities. During that time he was in charge of many notable developments in petroleum processes.

Three other California Research management shifts also were announced. Alois Kremser leaves as vice-president to become Follis' personal adviser on research matters, and two men move into vice-presidencies. L. P. Elliott, formerly assistant director of the Richmond laboratories, takes over Kremser's duties, while A. L. Lyman, who was in charge at Richmond, becomes director of all laboratories.

In revealing the changes, Follis declared:

"They are in line with our increasing emphasis on research. More than ever we intend to develop research to provide new products from petroleum and to extend our markets. Our plans call for a $2,000,000 expansion of present extensive California Research laboratory facilities at Richmond and El Segundo.

Howard G. Vesper

"Mr. Halloran has been directly in charge of the expansion that saw our program grow from the work of a few chemists and technicians to its present advanced stage. Now, California Research has a staff of more than 600, including many scientists outstanding in petroleum chemistry and allied fields.

"Mr. Vesper brings to his new position a unique combination of talents. In addition to his scientific training and experience, his recent duties have given him an intimate knowledge of customer requirements, which is expected to be valuable to him in tailoring the company's product creation to public needs and desires. He has worked both in developing new products and directing their marketing.

"The war has proved that petroleum is perhaps the most versatile of our natural resources and the possibilities for further development are virtually unlimited.

"While traditional products, such as gasoline, lubricants and the various types of lubricating and heating oils, will continue to comprise our biggest volume business, new and special products promise to become more and more important to our manufacturing and sales position.

"Just as important is the fact that, in being able to act as supplier of new basic materials for use of other industries, we are assisting in the general growth of industry."

Both Vesper and Halloran played important parts in Standard of California's war work, Vesper in handling allocations of all bulk products, except aviation gasoline, for essential civilian use and military requirements, and Halloran in directing a research program devoted 95 per cent to government and military projects.

Vesper, who went to work with Standard following his graduation in 1922 from the California Institute of Technology, recently has been manager of the gasoline and fuel oil division of Standard's marketing department.

A 1906 graduate of the University of California, Halloran majored in physics and chemistry. Soon after, he started with Standard as a chemist and became manager of development for the manufacturing department in 1920. From this start he directed the company's constantly expanding research program.

Kremser, who holds an M.S. degree from the University of Vienna, joined Standard in 1922 as an engineer. He transferred to research work three years later and has been a research executive since 1926.

Both Lyman and Elliott started with Standard in 1924. Lyman was graduated in chemistry from the University of California in 1923, while Elliott received an M.S. in chemical engineering in 1924 at the Massachusetts Institute of Technology.

The new management roster of California Research Corporation is: R. G. Follis, chairman of the board; H. G. Vesper, president; J. N. Adams, W. N. Davis, L. N. Elliott, A. L. Lyman and W. H. Shiffler, vice-presidents; Stanley Sharp, assistant vice-president; O. S. Loud, secretary, and H. D. Armstrong, treasurer.

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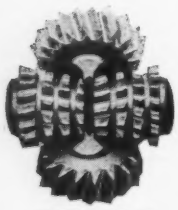

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Los Angeles Basin

Del Valle Test Reacts Favorably

Superior Oil Co. and British-American Oil Prod. Co. are preparing to carry their joint project, Black No. 1, ahead from present depth of 2963 ft. in shale and oil sand, after a formation test with packer set at 2820 ft.

Located in sec. 13-4n-18w, one mile west of the Kern sector at Del Valle and offsetting the Universal Consolidated, Aguirre No. 1 pumper, the try on test showed enough oil and gas to promise ultimate completion of an excellent producing well. Gas surfaced in only 20 minutes.

Richfield Adds New Bandini Try

Richfield Oil Corp. is grading ground for another test well in the Bandini area of Los Angeles County. This latest effort has been called Keller No. 1 and is located a short distance north and east of the U. P. Unit No. 1, in sec. 9-2s-12w.

The Keller well is the fourth venture for Richfield in the area. U. P. Unit No. 1, cored to 9310 ft. in oil sand and gray sand, is now running formation test of showings logged in lower part of the hole. Simons No. 1 in sce. 15 is coring at 7535 ft. Vail No. 1 in sec. 16 is making hole ahead at 5475 ft.

C. C. M. O. Co., Bandini No. 1 in sec. 21 is drilling below 8100 ft., and still aboye showings of consequential importance.

Buena Park Test Fails To Flow

Northwest of Buena Park in Orange County, General Petroleum Corp. is preparing to gun-perforate the interval of 11,900-11980 ft. in Librown No. 1 deep test in sec. 21-3s-11w. Swabbed for several days the well refused to flow. Last recovery from swabbing was 201 barrels gross of 25 gravity crude oil, cutting 12 per cent.

Union Quits La Habra Well

In the La Habra Heights area, between Whittier and Fullerton, where Union Oil Company made a new field discovery some months ago, a follow-up well, drilled under the "76" banner failed of its purpose.

It was Sansinena No. 16 in sec. 33-2s-10w, which explored to a total depth of 5984 ft., before ending the search as hopeless at that location.

The company's discovery in this area was made after 15 holes were drilled. Production came from 250 ft. of upper Miocene formation.

Union's holdings include the mineral rights in fee on a spread of four miles between the Murphy Ranch and Shell Oil Co.'s Columbia lease.

Leffingwell Attracts New Wildcat Activities

Rather than waning, interest in the Leffingwell area, between Santa Fe Springs and East Coyote, is increasing. The evident failure of Standard's Lewis No. 1 to ratify commercial oil production, indicated in earlier operations, has not been a discouraging factor.

Approximately one and one-half miles east of the Lewis venture Standard has made location for Stern Comm. No. 2-1 in sec. 7-3s-10w. South of the current try, the company is rigging to clean out and deepen the abandoned Wilshire-Annex Oil Co., Comm. No. 1 in sec. 14-3s-11w. Now known as Behnke No. 1, it was drilled originally to 9034 ft., before ending the new oil search in July, 1941.

Two miles northwest of the Behnke venture, T. W. Branch, Operator, is preparing to deepen the Hilo Oil Co., Hilo-Cinnabar No. 1 in sec. 1-3s-11w. T. & T. Oil Co. has the drilling contract for carrying the well on down from present depth of 6004 ft.

Chino Hills Job Bailing Water

Chino Hills Oil Co.'s Kraemer-Backs No. 2 in sec. 33-2s-8w in the Chino Hills, San Bernardino County, was last reported bailing water with an oil trace from a perforated interval from 1556 to 1626 ft. Total depth is 1716 ft., with casing cemented at 1459 ft.

Desert Wildcat Drilling Ahead

Near Palmdale in Antelope Valley, Del Sur Oil Co. is drilling Del Sur No. 1 in sec. 26-7n-13w around 2800 ft., without reported showings of oil or gas. In the Hi Vista area in sec. 33-8n-8w, Lehr Co. is fishing drill pipe. Total depth is 600 ft.

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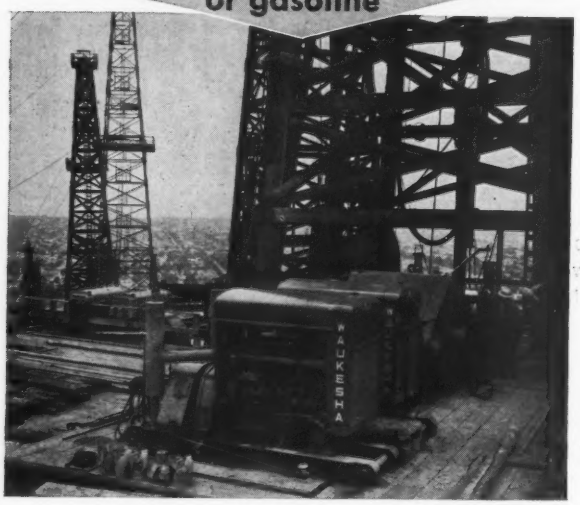

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Two of these Waukesha units, shown in the foreground, are direct-connected to the Emsco G-42 drilling outfit; the other two, shown in background, drive an Emsco 7¼ x 14 mud pump.

This Model 6-WAKU Waukesha 6¼" bore x 6½" stroke, 1197 cu. in. displ.—has every modern feature of design and construction. It delivers greater power per cubic inch displacement —a maximum continuous output of 193 horsepower plus. And it's rugged to the last fine detail... from oil pan to head.

Maintenance is easier and most economical—another Waukesha construction advantage. Valve grinding is simplified. Being an overhead valve engine, you remove the heads and do it where it's most convenient. Each cylinder is a wet-type sleeve. Press it from the main case and replace it—it's that easy.

For details, send for Bulletin 1139

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OIL FIELD POWER UNITS

Olive Area Test Ventured

McKee Oil Co. is rigging up Comm. No. 1 wildcat in sec. 16-4s-9w, Orange County. This location is about one mile south and east of the town of Olive. Pacific American Oil Co. will be in charge of drilling.

Basin Oil Starts Inglewood Project

Basin Oil Co. has staked location for its Simons No. 1 in sec. 28-2s-14w in the Inglewood area. Expectations are that work on the well will start in the very near future.

Richfield Well Reperforating

Lacking fluid on pumping trial, Clayton Severns and Associates are preparing to reperforate Wetzel No. 18 in sec. 32-3s-9w in the Richfield field, after shooting holes in the intervals of 4898-4903 ft. and 5045-5150 ft. Casing is set on bottom at 5150 ft.

Aliso Canyon Redrill Planned

Having set bridge plug at 6070-5927 ft. and cleaned out to 5165 ft., Wilshire Oil Co. now is making ready to redrill its Marquis No. 1 wildcat test in sec. 35-3n-16w in a southerly direction. Total depth is 9442 ft.

Oak Canyon Try Gives Up

Western Gulf Oil Co. has abandoned W. E. Stevens No. B-1 test in sec. 5-4n-17w in the Oak Canyon area at 9231 ft. Gun-perforated interval of 2380-2450 ft. was swabbed for 500 barrels of water a day.

Puente Wildcat Making Progress

Approximately 20 miles east of Los Angeles, A. W. Lyddon, Operator, is drilling his William Rowland Estate No. 3-1 wildcat test in sec. 17-2s-10w in the Turnbull area below 5150 ft. in shale. Location falls in the vicinity of the town of Puente, once a Spanish Rancho and finally subdivided for agricultural settlement in 1886.

San Joaquin Valley

Bacon Hills Try Gets Water Shutoff

Bandini Petroleum Corp.'s Bacon No. 1 in sec. 28-29s-21e in the Bacon Hills area, three miles west of the South Belridge field, has water shut off on 5-in. casing landed and cemented at 10,880 ft., and is moving ahead towards a production test of a Miocene formation above 10,840 ft. Total redrilled depth is 10,900 ft.

Gosford Explorer Finds Sands Gray

Rothchild Oil Corp. has pulled out of its K. C. L. No. A-56-2 in sec. 12-30s-26e in the Gosford area at a bottom-hole depth of 7030 ft. in gray sand. Poor oil sand was logged from 6684 to 6701 ft. Top Stevens was encountered at 6684 ft.

Bakersfield Test Drilling On Down

South of Bakersfield, Amerada Petroleum Corp. continues to drill steadily ahead at a depth below 5100 ft. in Castro No. 45-12 in sec. 12-30s-27e. Wagley No. 27-14 in the Ant Hill area in sec. 14-29s-29e is in shale at 4540 ft.

Grapevine Extender Ready For Pump Test

In the Grapevine area, British American Oil Prod. Co. and Capital Co. are ready to commence sustained pumping test of Tejon Ranch No. 41-5 in sec. 5-10n-19w, which widened the field about one-half mile. The test was of necessity delayed awaiting construction of tanks and lines. Total depth is 2660 feet in oil sand, with casing cemented at 2622 ft.

Buena Vista Venture Making Steady Progress

Seaboard Oil Co.'s SWUN-BVA No. 73-14 in sec. 14-32s-26e in the Buena Vista Lake area is drilling ahead below 9200 ft. in basal Etchegoin hard shale. This is the company's only drilling job presently in the state.

Two Dusters At Antelope Hills

In the Antelope Hills area, Hancock Oil Co. has abandoned Mabry No. 1 in sec. 36-26s-16e at 1375 ft., and Williams Bros. Oil Co., Layman No. 3 in sec. 12-28s-19e at 839 ft.

Meanwhile, Layman No. 4 in sec. 7-28s-20e is running tubing to complete at a total depth of 1082 ft. The 7-in. casing is cemented at 1007 ft.

Edison Area Still Active

Operational pace in the Edison area continues brisk, with interest in development there, apparently heightened.

In recent days, General Petroleum Corp. has completed Leddy-Nichols No. 2 in sec. 14-30s-29e on the pump for a small yield of 14 gravity oil from 2900 ft. Knapp No. 10 in sec. 24 is being rigged to pump from 2425 ft. after swabbed and flowing by heads at a 300-barrels a day rate.

Des Moines Oil Co. is bailing Cauley No. 3 in sec. 16-30s-29e, after the well sanded up, following completion on the pump at 3884 ft. for a yield of 150 barrels daily.

L. S. Gilmour, Operator, has finished Kirk No. 1 in sec. 6-30s-29e at 4619 ft. for an initial output of 132 barrels daily of 18 gravity oil. Neff No. 1 is bottomed at 4644 ft. in oil sand and casing now is being run. Neff No. 2 is redrilling at 4530 ft.

In sec. 16-30s-29e, California Exploration Co., Cauley No. 1 is coring claystone below 3800 ft.

Kern River Try Recements

Testing wet on four holes shot at 5735 ft. Tide Water Associated Oil Co.'s Luck No. 154 deep test in sec. 30-28s-28e in the Kern River area is standing recemented. Total depth is 5998 ft. and casing is set at 5850 ft.

New Strikes Loom At Cymric

H. H. Magee, Operator, is giving the finishing touches to Bolton No. 2 in sec. 22-29s-21e in the Cymric area. Bottomed at 6006 ft. flow on formation test of the interval of 5030-5050 ft. was rated at 500 barrels a day of 35 gravity oil.

Drilled and cored to a total depth of 5050 ft. and redolent with production promise, Honolulu Oil Corp.'s Midway-Premier No. 22-48 in sec. 22 is running liner to finish. Water shut off was obtained at 4875 ft.

Independent Exploration Co., seeking to duplicate production in its first well drilled on the Oceanic Oil Co. lease, is making headway with No. 2 in sec. 22-29s-21e, which last was reported preparing to run casing. Total depth is 2651 ft.

Superior Oil Co. is testing water shut-off at 4629 ft. in Woody No. 67-22 in sec. 22. M. P. No. 55-21 in sec. 21 is rigging up.

Tejon Test Stands Idle

Tejon Oil Co., Tejon No. 1A deep test in sec. 19-11n-19w in the Tejon area is still standing idle at a depth of 10,420 ft. Contractor is P. H. Frank, Inc.

Middle Dome Test Attracts Interest

One of the most closely watched drilling jobs in the Valley is Standard Oil Co.'s No. 73-30V in the Middle Dome area of Kettleman Hills in sec. 30-23s-19e. Last reported digging hard shale at 9625 ft., scheduled and prime objective is the Eocene, which, if found capable of commercial production, would open a wide area to new drilling.

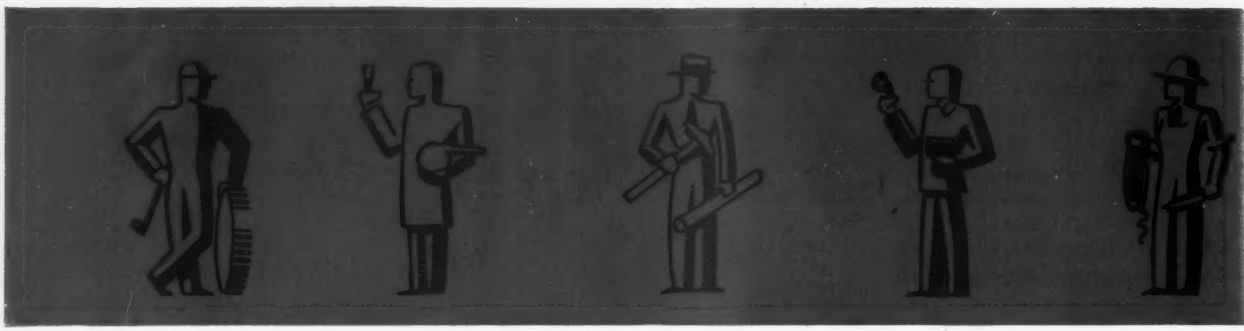
An oil sand found several hundred feet higher in the hole remains untried, due to packer failure on at least seven occasions. This zone is believed by field men to correspond to the formation penetrated by the old Burbank well, which was completed for a large oil flow, only to have casing subsequently leak. This was followed by a series of mechanical difficulties that finally wrote finis to the project.

Bolsa Chica Oil Corp. shares an interest in the Standard test under the terms of a unit plan of operations.

Test Fails At Round Mountain

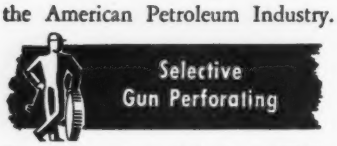
Homer Havenstrite, Trustee, has abandoned Skelton No. 1 in sec.

These men are on Lane-Wells pay roll . . . but

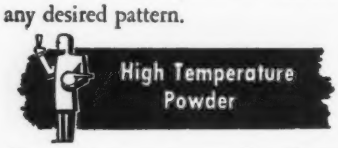


they WORK for YOU!

WITH the introduction of the Gun Perforator in 1932 Lane-Wells accepted the responsibility of providing Oil Operators with Services and Products to facilitate well completion, increase ultimate production, and lower production costs. The entire organization—Field Men, Engineers, Shop Employees and Officials—has worked closely with Oil Company Personnel to improve equipment and widen the scope of Lane-Wells activities to keep pace with the ever-increasing demands of the American Petroleum Industry.



The development of the Lane-Wells electrically fired Gun Perforator with Controller and internal gun wiring made possible Selective Gun Perforating. Perforations could be made individually and spaced to achieve any desired pattern.



Temperatures encountered in Deep Well Drilling range well above 300° F. Every known powder was tested to find a means of withstanding high temperatures with no decrease in penetration. Supplementing Lane-Wells research, development of military requirements has indirectly aided in the solution of powder problems.

249 different bullet shapes and sizes were given extensive field and laboratory tests to develop Steelflo—the bullet that provides clean perforations, deeper formation pentration.

Lane-Wells engineers perfected the Calibrated Line Measurement System to check accurately the careful measurement of drill pipe, tubing or casing in strain. No matter what measuring standards you have adopted, Lane-Wells can check them "on the nose."

Developed to permit easy, positive Olympic Packer operation in the high temperatures and high pressures of the 20,000-foot wells of the future, Floseal Packer Rings assure superior sealing at shallow depths with light tubing weight or at extreme depths with tremendous hydrostatic pressure added to the tubing weight.

The whole hearted acceptance and cooperation of the country's oil well drilling and producing companies enables the Lane-Wells organization to continue "to render a constructive service, to keep ahead of the field through constant research and to place the best interests of our customers first at all times."

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11-28s-28e in the Round Mountain area at a depth of 2676 ft. ,after the Vedder topped at 2650 ft. proved gray and barren.

General Petroleum Sponsors Test Trio

In the Saco area, General Petroleum Corp. is fishing for drill pipe in Kernway No. 42-1 in sec. 1-29s-26e, top of which is at 4511 ft. Hole is bottomed at 4880 ft. In the Rosedale area, Pioneer No. 82-36 in sec. 36-29s-26e is coring hard shale at 10,382 ft. In the new Santiago area, Sunset No. 21A in sec. 21-11n-23w is ready for formation trial between 3465 and 3550 ft. Bottom at 3643 ft. is in gray sand. Top oil sand at 3465 feet is based at 3550 ft.

Mt. View Wildcat Locating Water

J. Paul Getty is attempting to locate water in Derby No. 34 in sec. 33-30s-29e in the Mountain View area, after swabbing wet. Plugged depth is 5330 ft. J. A. C. No. 8-8 in sec. 8-30s-29e in the South Portals area is idle.

Getty recently extended his varied industrial interests by the purchase of the Spartan Aircraft Co. of Tulsa, Okla. The company plans to produce a postwar airplane as a successor to its prewar "Executive," plus a line of all-metal house trailers, freeze cabinets, refrigerators and floor furnaces. He has been president of the aircraft organization for some time.

California Men On Special Board

A. C. Stewart, vice president of Union Oil Co. of Calif., and W. T. Dinkins, manager of the marketing department of Richfield Oil Corp., are recent appointees to an expanded general committee of the American Petroleum Institute. The committee will serve until the next annual meeting of the Institute, scheduled for November.

DOUBLE PLAY!

Many emulsions are stabilized by the presence of wax particles.

NOBS new combination chemical dehydrates oil and re-suspends wax in one operation, reducing cost of production.

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Coastal and Northern District

South Mountain Adds Pumping Well

The Oil Tool Corp. has added a new pumping well in the South Mountain field, Ventura County. It is S. M. No. 7 in sec. 19-3n-21w, which went to a total depth of 4802 ft. for present production of 205 barrels of 26 gravity oil daily, cutting 4 per cent. S. M. No. 8 is making headway slightly beyond 1250 ft.

Elsewhere in the field, Hi Up Oil Co., S. M. No. 1 is fishing junk, with bottom at 2850 ft. M. & M. Associates, Yale Richardson No. 1 is drilling at 2750 ft. Los Feliz Investment Co., Macoil Co. No. 3 is idle at 3982 ft.

Rio Vista Well Excellent Producer

Amerada Petroleum Corp.'s most recent completion in the giant Rio Vista field is Serpa No. 2 in sec. 24-4n-2e which came in from 5559 ft. for 7,480,000 cubic ft. of gas through a 5/8-in. bean.

Workover Campaign Planned at Sespe

Cozi Oil Co., Long Beach, has taken over the Fillmore Oil Co. lease in the Sespe field, containing 21 shallow wells, which are scheduled to be worked over and reconditioned.

Field Try At Carpinteria Quits

With operations totally free of oil excitement, Western Gulf's Peter Cooper Bryce No. 1 in sec. 30-4n-25w near the beach in the Carpinteria area has been dropped at 3930 feet.

Water Swabbed At Ojai Venture

Plugged at 4672 ft. Volunteer Petroleum Corp.'s Hilltop No. 2 in sec. 7-4n-21w in the Ojai area, Ventura County, swabbed a small amount of water. Original bottom is 5211 ft.

Ginter Abandons Piru Prospector

Finding nothing worthy of a conventional test to 1480 feet, C. W. Ginter and Associates have abandoned as a production failure their Warring No. 1 in sec. 19-4n-18w in the Piru area.

State Offers Tideland Leases

The California Lands Commission has announced offers will be received on leases to explore for oil and gas on state owned tidelands. The acreage offered includes 764 acres at Summerland, 1505 acres at Carpinteria, 1427 acres in parcel A and 1254 acres in parcel B at Capitan, 1920 acres extending westerly from the Naples townsite at Elwood and 636 acres in parcel A and 635 acres in parcel B at the Santa Barbara Mesa.

Paskenta Test Shuts Down

Inclement weather and bad roads have forced Northern Oil & Gas Co. to suspend operations in Tiger No. 1 in sec. 1-23n-7w in the Paskenta area of Tehama County until a later date. Total depth is 1902 ft. in hard shale.

Merchants Pet. Adds Sespe Well

Merchants Petroleum Co. has completed Cochran No. 9 in sec. 1-4n-20w at a depth of 1636 ft., pumping 300 barrels of 20 gravity oil a day, cutting 2 per cent.

Standard Completing Solano County Test

Standard Oil Co.'s southeasterly extension test of the Kirby Hills, Fontana Farms No. 4 in sec. 31-4n-1e, which blew gas at the rate of 7,340,000 cubic feet daily on formation test of the interval of 2855-2990 ft. is about to be completed. Total depth is 5800, plug at 3100 and casing cemented at 3030 ft.

Texas Co. Rigs Yolo County Try

In the Dunnigan Hills in Yolo County, The Texas Co. is rigging up Hermle No. 1 in sec. 22-11n-1w, with the drill scheduled to start its quest for new gas in a few days.

Lompoc Wildcat Coring Hard Shale

Spot coring hard shale at 5565 ft. was the last report from Los Alamos No. 3 being drilled by General Petroleum Corp. in sec. 31-8n-33w in the Lompoc area of Santa Barbara County.

Santa Paula Try Getting Deeper

Standard Oil Co., Santa Paula Unit No. 1 in sec. 10-4n-20w in the Santa Paula area, Ventura County, continues to drill steadily ahead at a depth below 10,150 ft., without official intimation as to what may have been uncovered of petroleum interest to date.

Union Starting Four at Cat Canyon

Union Oil Co. has four drilling jobs on its Bell lease at Cat Canyon in various stages. No. 24 is a foundation, and No. 29 is drilling ahead below 5250 feet. No. 31 is preparing to rig and No. 47 is grading ground.

Palos Verdes Estates, Inc., P. C. No. 2 in sec. 27-9n-32w is running 7-in. casing, with bottom in cherty brown shale at 6303 ft.

General Drilling Co.

CONTRACTORS
SUPERVISION

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Small Rotary Rig. Complete or Parts. 4½ or 7 x 10—Power Pump.
Rotary Table—Swivel—Kelly, etc.
1000 ft. of 2⅞ or 3½ External Flush Drill Pipe. Hydril preferred. This must be in good condition. Write to Box 45. c/o California Oil World, 117 W. 9th St., Los Angeles 15, Calif. 1/5d

THIS LAUGH

OFF!!

The lawyer was not satisfied and in his most sarcastic manner, he said: "I asked you an intelligent question and I am entitled to an intelligent answer. What does Colonel mean in front of your name?"

The Colonel slowly turned over his quid of tobacco, spat spitefully into the spittoon, some ten feet away, and slowly answered, maliciously: "It's just the same as Honorable in front yours—it don't mean a damn thing."

"I've been watching that mechanic for the last 15 minutes. There's a man who really knows his business. He didn't spill a drop of oil on the ground. He put the hood down gently, fastened it securely, and left no fingerprints on it. He wiped his hands on clean tissue before opening the door, spread a clean cloth over the upholstery, meshed the gears noiselessly, and drove carefully out into the street."

"Yeah. That's his own car."

She: "Men are contemptible beasts!"

He: "Yeah, I know. That's why I run around with women."

"What party are you affiliated with at present?" asked the political canvasser.

"Ah prefers not to state at dis moment," answered Beulah.

"Come now. There's no harm in telling me."

"Mebbe not—but de trouble is, he hasn't got his divorce yet."

"I've come to fix the old tub in the kitchen," announced the plumber.

"Mama, here's the doctor to see the cook," announced the young son of the house.

Even though it's still hard to get enough meat and butter just think how much harder it would have been to learn Japanese.

"Every time I go to my club my wife thinks I'm out chasing women," said the octogenarian, adding: "Gad, how I wish she was right."

In this country a man can have but one wife . . . this is called "monotony."

"Daughter, when I was young, nice girls never held a man's hand."

"I know mother but nowadays nice girls have to hold a man's hands."

"Must you drive with one hand?" inquired the pretty passenger.

"Sure. The car won't steer itself," replied her boy-friend.

The soldier overseas received a letter from his wife at home announcing that a son had just been born to them. Overjoyed with the news the soldier grabbed the letter and ran to tell his Buddy.

"That's certainly great news," said the Buddy, "but haven't you been away from your wife for over two years?"

"Oh, sure," replied the soldier, "but there's nothing wrong with that . . . there's two years difference in the ages of my sister and I."

He: "I'm just groping for words."

She: "You'll not find any there."

"You were petting my ankle a minute ago, and now it's my knee."

"Do you mind?"

"No, but I will soon."

Navy wife: "When we were first married you said I had a shape like a beautiful ship."

Husband: "Yeah, but your cargo has shifted."

End of Willie's prayer—"and, dear Lord, please put vitamins in cake and candy instead of spinach and cod liver oil."

Senior: "So there really is a machine that can tell when one is lieing?"

Alumnae: "Absolutely. I married one."

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We know that wells are likely to be more profitable when equipped with JENSEN Pumping Units. It happens all the time, from coast to coast and Gulf to Great Lakes.

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IS IT TRUE WHAT THEY SAY ABOUT TORQUE?

CASE HISTORY NO. 1

One of the largest oil companies was having hard drilling in their well near Houston. The torque, at 150 R.P.M., in 7,000 feet of 9⅝" casing, with 4½" drill pipe, was 200*, approaching the "twist-off point"; therefore, the weight on the bit could not be controlled. Their pusher suggested casing protectors. After installation of 230 Patterson-Ballagh Protectors the torque at 150 R.P.M. had been reduced to 75. This was well within the safety limit. They were now able to control the weight on the bit, and drill faster and better.

To the *drilling superintendent:* this is proof that Patterson-Ballagh Protectors reduce torque, meaning less fishing jobs, more speed of drilling and less tool joint wear.

To the *well owner,* this means that casing wear has been reduced, meaning longer life for the well and faster drilling time, which lowers the overall cost.

To be absolutely sure that metal to metal contact does not take place, insist on a Patterson-Ballagh Casing Protector, at every tool joint. Protectors are now made of PBX synthetic rubber, lipped to streamline the drill pipe and give added wear and protection.

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PATTERSON-BALLAGH
DRILL PIPE AND CASING
PROTECTORS
Now Made of PBX Synthetic Rubber—Oil and Weather Resistant

Employee Training Program

(Continued from Page 12)

er, the worker with promotional possibilities, the foreman and the supervisor. All were included in a comprehensive program which was guided by the Employee Training Staff representative who had at his disposal approved information and the best techniques that company experiences had offered.

The fundamental task of training is the establishment of habits that are necessary for the efficient performance of the job. Some are concerned with the order of sequence of steps in the performance of the job, others are concerned with the care of tools and materials, others are related to safety measures, and still others involve attitudes and interests.

The employee training program has contributed materially in the successful operation of the plant which has resulted in the production of butadiene in excess of design capacity.

The processes originally contemplated have been modified to facilitate the recovery of valuable products other than butadiene. Important contributions have been made to the aviation gasoline program and materials other than butadiene are produced which are of importance to the rubber program.

In addition to the aforementioned, the plant recovers raw materials which are used in the chemical industry.

In order to solve the employee training problems attendant to this project, approximately 10,000 manhours of classroom instruction have been given to date. The benefits gained through Employee Training are more than commensurate with the cost and accordingly, management contemplates an even more extensive employee training program for the future.

This paper presented at the January 3rd Meeting of the California Natural Gasoline Association.

Emsco Forms New Research Department

The Emsco Derrick & Equipment Company, recognized as one of the leading manufacturers of oilfield drilling and producing equipment, announces the formation of a new research department to be devoted exclusively to the development of new products. During the war, Emsco, with their background of some twenty years' experience in the design and manufacture of oilfield equipment, devoted a substantial portion of their facilities to the development of new equipment for use by the Armed Forces. The formation of the new research department is a projection of these war-born research and design operations into the coming civilian economy.

G. R. Tremolada

The new department will be headed by Mr. G. R. Tremolada, Chief Research Engineer, who has been with Emsco since 1926. Born in Milan, Italy, he is a graduate of the Institute of Mechanical Technology, Santa Barbara Oriana of Milan. After graduating, he was appointed designer-engineer at the Isotta-Fraschini plant. Later Mr. Tremolada functioned as chief engineer for Bianchi-Canions Company. He then joined the Shibler (now Mulag) Company in Aachen, Germany, as consultant engineer, and acted in the same capacity at the Minerva Motor Car Works in Antwerp, Belgium. In 1917 Mr. Tremolada was affiliated with the Northwest Motor Company in Detroit, and the Pontiac plant. He then transferred to the General Motors research laboratory in Dayton, where the development of the Whirlwind Motor was under his direction.

The Emsco organization feels that the new research department, with a man of Tremolada's capabilities at its head, will make itself felt in the field of new product development during the years to come.

"It's a Wilson"

More new special jaws make our Tongs cover ranges never before covered by simply changing lug jaws. One man tongs. Easiest applied. Write for information.

Casing Tong Head for AAX and B

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Coyote Job Mills Packer

Barnsdall Oil Co.'s third production attempt on the Sunny Hills Ranch in sec. 21-3s-10w near the East Coyote field is milling on packer, with hole bottomed at 6982 ft. Unlike two earlier wells, the present try has found but little oil.

Liners
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Expert liner fabrication to your specifications is a Pacific service that helps speed completion . . . saves work . . . insures the proper liner for your well conditions.

Pacific Liners are made in special cutting machines from blank pipe, and either Keystone or straight slots are furnished, as desired. Spacing, size and type of perforations are designed for existing bottom hole conditions in the well, insuring an efficient, trouble-free liner job.

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Patterson-Ballagh Dead Line Stabilizer

Like the now famous wire line guide, the new Patterson-Ballagh Dead Line Stabilizer has been almost universally adopted as standard equipment in all fields in which it has been sold. Many successful installations have proven their worth.

The only wearing part of the stabilizer is the oil proof PBX Synthetic rubber lining, simply installed sections and easily replaced. The stabilizer does not bend the line, allows freedom of movement, with absolutely no wear to the line. Prevents the whip so destructive to weight indicators. Line failure at the finger board is eliminated, a failure often very costly and dangerous.

Specifications

Patterson-Ballagh Dead Line Stabilizers are obtainable in two sizes, two-section and four-section. Generally for most derricks the four-section style should be used. However, for short derricks and rigs without finger boards, and as stabilizer to protect weight indicator, the two-section style is preferable. Shipped complete with PBX rubber lining, safety line, adjusting wedge and bolts. Weight, four-section, 115 lbs. Weight, two-section, 70 lbs.

The model shown above is the 4 section, code name DEARTH. Installation of the refills is easily accomplished by loosening the "Hammer" nuts which quickly unlocks the frame allowing it to swing open. The Refills are cupped to hold a lubricant, and are split half way through to insure ease of installing.

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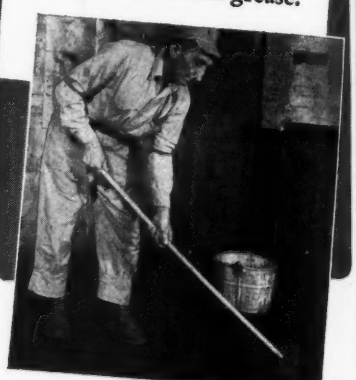
KELITE NO. 158 cleans in a hurry . . . economizes on time, labor and materials through scientific pH Control. This specialized material, manufactured for heavy duty cleaning, is particularly efficient in the removal of oil and grease.



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KELITE
KELITE pH Control

Dagany Gap Oil Failure

Recovering only oil spotted muddy water on formation test of the interval of 1468-1577 ft. Shell Oil Co.'s U. C. No. 1 in sec. 3-25s-18e in the Dagany Gap area near Devils Den is an abandonment.